A Study of Student Interaction in an Online Learning Environment Specially
Crafted for Cross-Level Peer Mentoring

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Regina Ruane
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Dedications

To my family
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Abstract
Regina Ruane
A Study of Student Interaction in an Online Setting Specially Crafted for Cross-Level Peer Mentoring

This study explored the ways that students in an online teacher education program connected in a specially crafted peer mentoring program developed for cross-level peer mentoring. Program administrators developed the peer mentoring site in response to observations that enrolled students, particularly new students, were often unsure of how to complete course requirements using the online platform, access tools and program information, interact with other students, and register for upcoming terms. This study aimed to determine patterns of communication among the members and the structure that these interactions and relational patterns assume in the online peer mentoring program. Additionally, this study aimed to identify how these interactions share a common evolution of relationship development in a setting where newcomers and more experienced peers converge to discuss, share, and learn from and with one another. This study used social network analysis and interpretive content analysis to analyze and describe the interactions of students participating in the online peer mentoring program considered. Together, the social network analysis and interpretive content analysis allowed for a holistic view of the peer-mentoring sites that assisted this researcher in developing an analysis and interpretation of the function and purpose of the peer mentoring sites. The interpretive content analysis provided insight into the discussions by demonstrating topics of interest to the students, either as posts responding to
facilitators’ prompts or as topics raised by the students independently. The peer mentoring sites provided newcomers to the undergraduate education program meaningful interactions regarding program and education related topics and experiences. The sociograms showed gender, age, ethnicity, geographic location, level in the program and participation in more than one peer mentoring site for all participants in the selected sites. The participants of the six peer-mentoring settings were predominately from Pennsylvania and female. Computer-mediated communication provided the opportunity for the students to connect with their fellow program participants despite geographic location and age. Overall, the students collaborated with their peers and engaged in problem-solving activity and inquiry.
CHAPTER ONE

1.1 Prologue

This study seeks to explore the ways that learning in practice, social interaction, and mentoring can bring students together to create greater learning experiences in an online environment. This study will use social network analysis and interpretive content analysis to analyze and describe the interactions of students participating in an online peer mentoring program that encourages student participants to discuss, share, and build upon their experiences. The goal of this study is to understand the ways that students in an online teacher education program connect in a peer mentoring setting. Additionally, this study examines the corresponding social networks formed by the participants in the peer mentoring sites considered.

Previously, this researcher conducted an ethnographic action research project observing the social interactions among a group of eighteen kindergarten students at an all boys’ school. The focus of that study concerned the power and gender dynamics of the kindergarten students in a playground environment. The social interactions, gender and power dynamics among the students in that study sparked this researcher’s further interest in social dynamics and how they may correlate with learning. With the increasing popularity of online course offerings and the rise of technology’s role in the education process, this current study seeks to understand how social dynamics function to form an online network among students enrolled in an undergraduate teacher education program.
1.2 Introduction

Learning is a way of being in a social world. Learners, according to Lave and Wenger (1991), are engaged both in the contexts of their learning and in the broader social world within which these contexts are produced. Learning is a practice, and engaging with others helps form the families of practice that allow the ideas to take hold in people’s repertoires (Wenger, 1991). Coordinating and communicating in endeavors with others involves adjustments to stretch common understanding to fit with new perspectives of their shared learning (Rogoff et al., 1995). In Lave’s (1997) study of learning in practice, she ascertained that learners encounter the opportunity to develop procedures and styles derived from multiple and varied circumstances from their everyday activity, i.e. dilemma-motivated experiences. These activities are more of a learning curriculum as opposed to a teaching curriculum (Lave, 1997). The learners’ practice will be shaped duly by these experiences (Lave, 1997), because a person is part of an activity not separate from it (Rogoff et al., 1995). Tapping into these experiences, according to Lave (1997), will help to understand what is motivating the activities of the learners and what they are coming to understand in practice.

Often the focus of educational policy leaders has been to provide students with skills intended to prepare them for national standardized testing (Gabriel, 2011) instead of opportunities for dilemma-based learning. Providing students with learning curriculum opportunities in schools can be time-consuming to construct and manage, so they are often left in the idea phase. According to Lave (1997), learning curricula arrange opportunities that allow students to: (1) encounter real-world situations, (2) work out answers using their own techniques, (3) engage with fellow students regarding their
thinking, and (4) generate understanding, the essence of learning in practice. Learning in practice centralizes understanding and allows learners to have the opportunity to develop around that which they are learning and experience the subject matter from all angles (Lave, 1997). Barab and Duffy (2000) contend that if learning is not anchored in real issues, it is likely that the result will be knowledge that remains inert.

This study will be an inquiry into the activity and interactions of students in an undergraduate teacher education program as they participate in an online peer mentoring site. It is anticipated that analyzing discussion posts authored by the participants in the peer mentoring sites will aid in determining what motivates the discussions and what experiences the site provides. Illustrating each site as a network will show the structure of the connections that form among the participants. This research will examine whether the peer mentoring sites will provide the participants with the chance to solve and discuss issues, concerns, and dilemmas in their studies. The interactions of the peer mentoring sites will be among novice and expert students who are all at different stages in the preparation of becoming teachers. According to Lave (1997), inquiry into the activity-motivating aspects of situations as experienced by learners will provide understanding and insight into the learning that is emerging in practice. Lave (1997) has found in her research that learners learn actively and through construction and invention.

1.3 Background

Technology and the connective power of the Internet have made online learning a growing industry, enabling schools to have more diverse and far-reaching audiences while changing the very nature of teaching and learning (Rovai, Ponton, & Baker, 2008). During the 2008-9 academic year, approximately 4.6 million college students took at
least one online course (Allen & Seaman, 2010). With the introduction of numerous
Internet-based learning management systems, distance education delivered mostly
asynchronously via the Internet is the most popular online mode used in higher education
today (Rovai, Ponton, & Baker, 2008).

Online learning gives students more flexibility and new methods to facilitate
learning. Asynchronous online programs provide the “anywhere, anytime” convenience,
which allows students and instructors the flexibility of completing courses without
meeting at specified times or in specific places (Rovai, Ponton, & Baker, 2008). Using
the Internet as a means to connect with others gives users the opportunity to span
multiple time zones (Haythornwaite, 2002).

While research has shown the benefits and effectiveness of online learning, there
are still detractors. Some researchers have challenged the instructional soundness of
online courses with the rapid rate of development at many higher education institutions
(Hirumi, 2005; Morrison & Anglin, 2006). Further, individuals in new computer-
supported learning environments face an overwhelming array of new challenges, which
include adjustment to new media, new rules of behavior, new course materials,
classmates, and a new balance of home, work, and school responsibilities (Haythornwaite,
2002). These initial challenges can be expected to fade with increased familiarity, but the
initial adjustment can be a serious impediment for first-term students (Haythornwaite,
2002).

Processes aiding the transition to university for first-year students have included
faculty or discipline-specific programs (McInnis, James, & Hartley, 2000) such as
academically oriented peer support programmes (e.g., Ashwin, 2003), reciprocal peer
tutoring (Rittschof & Griffin, 2001), online support (e.g., O’Reagan, Geddes, Howe-Piening, & Quirke, 2004), and mentoring programmes (e.g., Heirdsfeld, Walker, & Walsh, 2005; Pollock & Georgievski, 1999). Peer mentoring programs provide an avenue for new students to be supported by more experienced mentor students and make social connections with other new students (Glaser, Hall, & Halperin, 2006; Muckert, 2002).

In general, peer tutors help other students either on a one-to-one basis or in small groups by continuing classroom discussions, developing study skills, evaluating work, resolving specific problems, and encouraging independent learning (Falchikov, 2001; Goodlad, 1998; Saunders, 1992). Peer tutoring results in motivation (Carroll, 1996; Falchikov, 2001; Fraser et al., 1977; Millis & Cottell, 1998), learning for students (Fraser et al., 1977; Johnson & Johnson, 1985), and learning (Entwistle, 1997; Millis & Cottell, 1998) and empowerment for the tutors themselves (Goodlad & Hirst, 1989; Miller & MacGilchrist, 1996; Parkin & McKeagany, 2000).

While mentoring relationships have benefits, it is also recognized that problematic situations arise. Potential problems that may arise in a mentor-mentee relationship include: (1) a mentee’s misperception of the mentor, (2) mentee problems of which the mentor is unaware, (3) organizational, cultural, or professional aspects, which may negatively impact mentoring relations, and (4) personality traits and complex interpersonal processes (Gromley, 2008). Additionally, it has been recognized that ethical concerns, such as multiple roles in mentoring relations, effectively managing power differentials, and abandonment issues, can all negatively impact mentoring relations if these situations are not managed properly (Eby et al., 2000).
Computer-supported learning environments offer the opportunity for mentors and learners who are not collocated to engage in mentoring experiences (Dennen, 2004). Dennen (2000) found that computer-mediated, collaborative, problem-based learning scenarios help to motivate students. Hayward et al. (2001) also found mentors and mentees learning through the process of reflection and articulation in computer supported collaborative learning settings. Dennen (2004) suggests that research in online learning has been robust, and technology holds great promise as a mediator and provider of mentoring opportunities. Evaluations indicate that mentoring programs have a positive effect on new students entering higher education (McInnis, James, & Hartley, 2000) as peers are often considered to be the most powerful influence in undergraduate education, even more so than advisors and instructors (Duch, et al., 2001; Ender & Newton, 2000; Fortney et al., 2001; Garside, 1996; Newcomb & Wilson, 1966).

1.4 Statement of the Problem

This study examines the development and implementation of the online peer mentoring program for undergraduate students in the School of Education at Drexel University. This section begins by introducing the inception of the peer mentoring program.

In 2006, program administrators at Drexel University observed that students experienced difficulty in adjusting to their online programs. Specifically, it was observed that students in an online baccalaureate program (new students in particular) were often unsure of how to access and maneuver through the courses, complete the course requirements using the online platform, access tools and program information, interact with other students, and register for upcoming terms. Additionally, the administrators
found an abundance of student concerns and questions on what they could expect from future aspects of the program. Recognizing the insecurity, questioning, and anxiety among a growing student population of over one hundred and thirty students and only one staff member working with the program as an academic advisor, the program administrators determined a new support system was necessary to address the needs of this growing online student population.

In 2007, the program administrators of the online baccalaureate teacher education program at Drexel University developed and implemented an online mentoring site to bridge upper-level students and new transitioning students enrolled in this program. The mentoring site would provide an online forum for students from the instructor-led first-year seminar course on foundational issues in education to connect with students enrolled in the instructor-led third-year seminar course. The third-year students were preparing for the field experiences of pre-student and student teaching. It was thought that the new students could gain valuable information and insight from the experience of the more advanced students. Similarly, it was thought that the more experienced students could also benefit from this opportunity to further develop and share what they have learned in the course of their study. Providing an online discussion setting wherein the new students could exchange information with more experienced students in the program who had already completed their level in the program would allow the students to: (1) discuss their questions, concerns, and thoughts, (2) learn about the upper-level student experiences, and (3) provide a forum of collegiality, where they could learn from one another.
The mentoring site that was developed joins students in an online course setting using the Blackboard™ management system to provide a forum where students could interact through threaded discussions. The aim was to create an environment encouraging interaction between the first-year and the third-year students in the online teacher education program. Both of these student populations are pursuing the Bachelor of Science degree in education and the elementary teaching certificate to become professional educators. While the students are at different levels in their course of study, they all are studying to become professional educators, thus providing the terms of cross-level peer mentoring. The student population represents various geographic positions around the globe, including Germany, the United States, China, among others. Such diverse backgrounds lend a global perspective to both the program and the mentoring sites.

Both the first and third-year seminar courses provide mentoring guidance through weekly activities led by each instructor. The role of the seminar instructors is to monitor the mentoring sites. The students did not receive any training in mentoring prior to the experience. The students will convene in the peer mentoring sites where they have the opportunity to engage with all participants in the discussion boards of the sites. The participants are asked to post two or three times in each discussion as part of the seminar coursework. It is important for participants to “engage in professionally meaningful and productive discourse” (Schlager, Fusco, and Schank, 2002, p. 137). Schlager, Fusco, and Schank (2002) observed that new members or participants need to learn “the ropes”. It is anticipated that the new members can find support through interaction with and the example shown by more experienced members. Schlager, Fusco, and Schank (2002)
have found that new participants are quick to engage through peripheral participation in activities being conducted by more experienced members.

The peer mentoring sites created within Drexel’s online teacher education program has many unique characteristics. Specifically, the peer mentoring sites connect the first and third year undergraduate teacher education students, who are separated by time and location, thereby creating cross-level peer interaction. The peer mentoring sites seek to engage these students in the process of social learning while they prepare for a professional career in teaching. Further, the peer mentoring sites present opportunities for the students to discuss their experiences, perspectives, thoughts, and questions with each other to the level at which they are comfortable. Finally, the peer mentoring sites encourage the students to discuss the field of education and their preparation to become members of the profession. The literature of this field has not previously addressed this specific type of situation, where cross-level peers enrolled in the same online course program discuss, interact, and exchange experiences, thoughts, questions, and answers regarding their practice. The void of literature in the field on this particular subject matter underscores the importance of this study.

1.5 Research Questions

1.) How are the first-year and third-year students enrolled in an online undergraduate teacher education program using peer mentoring sites specially crafted to engage new students with more experienced students?

2.) What communication patterns emerge from the interactions of students in the online peer mentoring sites?

3.) What factors influence the interaction patterns among the students in the peer mentoring sites?

a) What relationships and roles arise from the interactions?
1.6 *Purpose*

The purpose of this study is to provide a better understanding of student interactions in online peer mentoring sites developed to provide new online teacher education undergraduates with the opportunity to interact with more experienced peers. This study aims to explore the ways in which students interact in this setting, especially where interconnections with persons, activities, and knowledge provide a means to determine how the theory of social practice (which includes learning) aids in thought development and newcomer advancement (Lave and Wenger, 1991). Lave and Wenger (1991) have shown that experienced members can successfully provide guidance to newcomers and moderately-experienced members through their interactions and example.

The online mentoring sites allow the new and more experienced students the opportunity to engage in discussion and problem-solving situations. The design of the sites possess the following elements of Barab and Duffy’s (2000) definition of a practice field, which is a setting designed to support the development of shared goals, understandings, and practices among those collaborators working on a particular problem or issue. The practice fields have a clear separation in time, setting, and activity, for which students usually come together for one course. These settings involve student ownership of the inquiry, coaching or modeling of thinking, opportunities for reflection, support for the learner, introduction to the context of the problem and its relevancy, and work that is collaborative and social (Barab and Duffy, 2000).

The online peer mentoring sites move beyond the definition of a practice field in that students participate in these settings as part of two courses, first as a newcomer and later, as a more experienced student. Additionally, from the start of the program, the
students are consistently engaged in observations and practica in schools as part of other coursework, so they are experiencing and seeing first-hand, real-world situations. The peer mentoring students have the opportunity to solve authentic problems that they bring to the discussions in these settings. This is different from the practice field approach, where students are expected to explore dilemmas outside of the school context when their learning has been completed (Barab & Duffy, 2000).

The peer mentoring sites have the potential to become communities of practice. A community of practice is a collection of individuals sharing mutually defined beliefs, practices, and understandings over an extended period of time while pursuing a shared enterprise (Barab & Duffy, 2000; Wenger, 1998). In a community of practice, participants share understandings concerning what they are doing and what these actions mean for them and their community (Lave & Wenger, 1991). The community of practice settings, according to Barab & Duffy (2000), must have a common historical heritage, which includes shared goals, negotiated meanings, and practices to produce something larger than the participants themselves, and a cycle through which newcomers can become old timers, allowing the community to continue to maintain itself. Studying each peer mentoring site from its inception will demonstrate whether students benefit from shared experiences.

The aim of this study is to determine how the communication network within each peer mentoring site develops, what topics the participants discuss, and how first- and third-year students interact in these settings. Providing data on the types of interactions occurring in the peer mentoring sites will serve to offer (1) detailed analyses of the interactions among the participating new and experienced students and (2) what
these interactions demonstrate, especially regarding the peer mentoring sites’ purpose, which aims to provide new students with opportunities to engage with more experienced students. According to Feenberg and Bakardjieva (2004), it is extremely important to continue systematic research efforts among online groups to “identify, describe, and understand the specific forms of social life within computer-supported environments and the related benefits, drawbacks, and consequences for participants, culture, and society” (p. 41). Such research can then become the basis for future development of online communication forms toward socially-desired ends (Feenberg and Bakardjieva, 2004).

One aspect of this study is to follow the development and content of student discussions, and how they transform as they proceed. Additionally, this study aims to determine patterns of communication among the members and the structure that these interactions and relational patterns assume in an online learning environment. Finally, this study aims to identify how these interactions share a common evolution of relationship development in a setting where newcomers and more experienced peers converge to discuss, share, and learn from and with one another.

Taken together, this information will illustrate the activity of the peer mentoring sites from both a macro and micro perspective. From a macro perspective, one may see the patterns of interaction through the direction of postings and the person-to-person interactions of all participants in a network setting. Such an analysis “can reveal complex relations among messages’ content, timing, ownership, and the critical discourse a discussion session generates” (Zhu & Baylen, 2005, p. 453). Conversely, the micro perspective will provide detailed information regarding the discussion topics, the content of the posts, and the development of the discussions. Knowing the types of patterns that
emerge from the student interactions in these settings can provide a better sense of how participants engage with one another and can assist in determining whether such forums may be expanded upon or improved. These patterns can show the support and advising relations that develop among students, the patterns of learning that develop as the students engage with their peers, and what results from the dilemma-motivated and practice-centered interactions, discussions, and learning in a specially crafted online learning environment.

1.7 Significance of the Study

Examining student exchanges in the online peer mentoring sites aids in providing an understanding of and insight into learning and practice in a situated environment. In Lave’s (1997) research, she has found that learners encounter opportunities to discuss and further develop their practice in their day-to-day activities. Characteristics of their activities show students finding ways to enact solutions through ongoing activity (Lave, 1997). Discussing and determining ways to solve the dilemmas allows for active learning through construction and invention (Lave, 1997). Similarly, according to Rogoff (2003), studying the relationships of participants with those with whom they interact allows a researcher to focus on what they are doing together and the developments that emerge from their interactions and communications. Exploring this perspective in online peer mentoring sites will add to this field of research.

Conversely, Colvin’s (2007) research focuses on formalized mentoring programs in educational settings. Future research providing a detailed contextualized examination of the interactions in mentoring situations and the impact on academic socialization would be beneficial to the field (Colvin, 2007). This information will aid in the future
training of mentors and in providing ongoing support for effective participation in mentoring programs (Heirdsfield, Walker, Walsh, and Wilss, 2008). Additionally, exploring peer mentoring interactions in online settings will provide higher education institutions with research data, which can determine if such experiences may offer beneficial learning opportunities. This information can lead to increased learning opportunities which educators may use to supplement their curricula.

Few studies have explored peer tutoring and mentoring at the college-level either in online or face-to-face settings. DeSmet, VanKeer, & Valcke (2008) explored cross-level peer tutor behavior in asynchronous online discussion groups discussing cases and solving authentic problems in an Instructional Science Course. Anderson & Colvin (2003) studied a formalized peer mentoring program consisting of two three-credit-hour courses – one fall semester, one spring semester – taken with the same professor and classmates, where incoming students receive advice and help from more experienced peers. Researchers have also examined academic support in higher education institutions. This research consisted of tutorials that allow first-year students (mentees) to review course content in a more concentrated manner (Clulow, 2000; Weisz & Kemlo, 2004) and training in academic skills such as assignment writing, referencing, and strategies for exams (Muldoon, 2004; Trafford, 2003). Barab, Barnett, and Squire (2002) describe a similar program at Indiana University, where mentors and mentees interact in a formalized mentoring program from freshmen to senior year in a face-to-face manner. While this research illustrates peer mentoring experiences at the higher education level, Colvin (2007) believes that most research in peer mentoring has focused on young students and that research in peer mentoring with older students would broaden the
research in this field. This study seeks to contribute to the field by conducting new
research that will analyze the patterns of interaction among students in online peer
mentoring sites, where novice and more experienced students engage with one another in
a forum to discuss topics about their program, experiences, and the field of teaching.
Further, this study seeks to contribute to the body of research concerning learners who
are learning in practice.

Administrators and faculty can better understand and support students in their
learning and academic achievement with an increased understanding of student learning
and interaction in online settings, especially in specially-crafted student support
mechanisms like a mentoring site. Culling data from examples of students’ interactions
and communication will aid in the understanding of what is happening in these
environments. Kumpulainen and Mutanen (2000) contend that there is a need for
analyses that will increase current understanding of the social conditions and practices of
collaborative learning.

According to Kumpulainen and Mutanen (2000), student-centered learning
activities, collaborative working modes, authentic learning contexts, and technological
innovations are giving students more chances to participate, observe, ponder, and practice
socially-shared ways of knowing and thinking. With peer-to-peer interaction increasing
in educational settings, it is becoming increasingly important to better understand how
meanings and knowledge are constructed between students whilst working in small
groups or teams in various learning activities (Kumpulainen and Mutanen, 2000). Taking
a holistic and multidimensional approach to the interactions of the peer mentoring sites
will provide data to understand how students interact with one another and if such experiences are beneficial.

When students have an opportunity to engage in discussions with one another regarding their area of practice, they can learn and discuss their work with one another, thereby learning collaboratively. Learning within a collaborative context has garnered support from researchers and theoreticians (Barab, Barnett, & Squire, 2002). Barab, Barnett, & Squire (2002) found that more experienced peers were able to appropriate the necessary skills and take on the responsibility of being in charge of directing their own learning processes. In the community context, students can observe more experienced students and model those experiences (Barab, Barnett, & Squire, 2002) in accordance with what they observe.

In this paper, exploring the interactions of the peer mentoring sites will serve to add to the body of research in communities of practice and increase understanding in the way students come together in such settings, how they form connections, and create their own learning, both individually and collectively pursuing the same goal. Studying these interactions will help determine the patterns that are grounded in this practice. Information on the mentoring site interaction serves to better understand student development and learning in such settings for future development in education. Analysis of the discussion board postings will lend insight into the questions and situations that arise from the students' experiences, discussions, and field-based practice. Further, the discussion board postings will show the ways students assist one another to resolve these issues.

The results of this research may also serve to inform retention and attrition
patterns in undergraduate students. Tinto (2006) believes that attrition in higher
education lies in the very character of the educational settings where students
learn. Tinto (2006) recommends that institutions support new students in their first
year. Tinto (2006) has found that most first-year students feel uninvolved due to the
following factors: (1) passive participation in their learning, (2) completion of courses as
detached, individual units, often separate in content and peer groupings, and (3) the view
that courses are just a means to their career path (Tinto, 2006). In order to better support
students with the first-year transition, Tinto (2006) recommends that colleges and
universities use collaborative pedagogy techniques to engage first-year students by
allowing students to take courses together through a registration block or by linking
students through courses, as in the peer mentoring sites. Methods of grouping students
together can ensure that students have a way to address relevant issues and problems
together through shared interactions (Tinto, 2006).

The insights gained from this study also have the potential to advise decision-
making and encourage wider incorporation of peer mentoring for online programs at the
higher education level. It is thought that a better understanding of the patterns,
development, and shape of the peer mentoring sites will aid in the research of such sites
at the higher education level, as very little research currently exists in this area. This
study will serve to extend the field of research on intentionally-designed settings to
support learning by encouraging and providing opportunities for learners to interact with
their more experienced peers in an online setting (Barab, Barnett, & Squire, 2002; Lave
Barab, Barnett, & Squire’s (2002) research studies communities of practice in education, advantages of learning within a community of practice, and issues to be addressed if such communities are to evolve. Barab, Barnett, & Squire (2002) contend that researchers need to provide more grounded accounts of communities of practice in school-based settings. This study seeks to contribute to this research effort: examining a peer mentoring community in an academic setting.

1.8 Conceptual Framework

The theories guiding this study include situated learning, community of practice theory, and online network interaction. This theoretical background serves to provide a conceptual view for studying peer mentoring interactions in a situated online context designed to bring a group of pre-professional teachers together.

Palloff and Pratt (2001) contend that creating a sense of community in an online educational environment is an integral and vital part of the learning process. Communities of practice provide students with opportunities that allow students to become both active and purposeful participants in quality educational experiences aiding in the enhancement of learning outcomes (Cross, 1999; Little, 1996). The ability of students to interact is an essential component in the development of learning communities, and aids in engaging learners (Schwitzer & Lovell, 1999). This can lead to personalization, a higher self-regard, and a chance for students to connect with their peers (Maeroff, 2003).

Barab, MaKinster, et al. (2003) define a community of practice as “a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or
mutual enterprise” (p. 5). Communities of Practice are more than merely a temporary coming together of individuals around a particular goal or for a course (Barab, Barnett, & Squire, 2002). Communities of Practice grow, evolve, and change dynamically, transcending any particular member and outliving any particular task (Barab et al., 1999). Communities emerge through interactions among participants rather than by design and “gain their richness, complexity, and opportunities for learning through their multigenerational structures and member pathways for movement through community” (Barab, Barnett, & Squire, 2002, p. 496).

A community of practice is an entity that has structure and identity that consists of, but is different from, its individual members (Barab, Barnett, & Squire, 2002; Barab & Duffy, 2000; Lave & Wenger, 1991). This community identity, according to Barab, Barnett, & Squire (2002), can be thought of as a classroom culture, which is constantly transforming as new members contribute, support, and eventually integrate into the community. Even though the new members are changing the culture, the group will have a common history. History, according to Barab, Barnett, & Squire (2002), provides continuity and a stable structure for student interaction so that newcomers are not left to create boundary structures each time.

Communities of practice are critical for knowledge-building and knowledge-building routines and provide collaborative social opportunities that allow individuals the freedom to think flexibly and experience different forms of support (Schlager and Fusco, 2004; Shumar and Sarmiento, 2008). Barab, Barnett, & Squire’s research (2002) advances thinking on designed communities of practice, the advantages of learning within them, and critical issues that need to be addressed for such communities to evolve.
Issues that have relevance to educators who are interested in facilitating communities of practice that are intentionally designed to support learning, according to Barab, Barnett, & Squire (2002), are the interrelations of meaning, practice, experience, identity, and community. Additionally, Barab, Barnett, & Squire (2002) have determined that when describing learning communities, researchers need to not only describe the rules, structures, and participants in a community, but also the processes through which they interact.

Vygotsky’s (1978) sociocultural theories provide a framework to better understand learning as a process of social negotiation, collaboration to make sense of problems, construction of knowledge, and mentoring. Additionally, Vygotsky (1978) theorizes that intellectual development takes place between people before a participating individual internalizes the concepts. Similarly, Zhu and Baylen (2005) found that instruction is most effective when it takes place in settings where learners can interact with peers, adults, or mentors who challenge or scaffold their learning. In this respect, students are actively building knowledge through interaction, discussion, and elaboration (Zhu & Baylen, 2005). Meaning is often formulated through the social process (Vygotsky, 1978), therefore cultivating environments that promote social interaction among learners will aid in this endeavor.

According to Lave and Wenger (1991), “peripheral participation” denotes being located in a social world. This relates to Dewey’s (1916) words, “the living creature is a part of the world, sharing its vicissitudes and fortunes, and making itself secure in its precarious dependence only as it intellectually identifies itself with the changes about it, forecasting the future consequences of what is going on, shapes its own activities
accordingly" (p. 393). This means that persons engage in activity in and with the world, where the person, activity, and the world mutually constitute each other (Lave and Wenger, 1991). Learning involves the whole person becoming a full participant or member by defining his or her own part in the broader systems of relations and roles of the community (Lave and Wenger, 1991). Rogoff et al. (1995) emphasize that development in such settings cannot be explained in isolation from the contributions of other people and of the traditions of practice in which they are participating. Sfard (2008) emphasized that thinking and communicating are conjoined. Using the term commognition, Sfard (2008) stresses the developmental unity of the processes of thinking and communicating. Commognition views human communication as a pattern of collective activity that involves a repertoire of communicational actions of individual members, and for each action, a repertoire of permissible re-actions of other individuals (Sfard, 2008). Lave and Wenger (1991), Rogoff et al. (1995), and Sfard (2008) emphasize the interconnectedness of actors in communal situations and the effects the participating actors have on one another in the advancement of thinking and learning.

Lave and Wenger (1991) emphasize that “learning is an integral part of generative social practice”, not merely situated in practice as if it were in some alienated location (p. 35). People move from a phase of newness to one of integral constituency through engaging in the social practices of a given community or setting, where “constituents contribute inseparable aspects whose combinations create a landscape – shapes, degrees, textures – of community membership” (Lave and Wenger, 1991, p. 35). “Legitimate peripheral participation” describes the way that learners “participate in communities of
practitioners”, where newcomers acquire mastery of knowledge and skill to move toward full participation in the sociocultural aspects of a community (Lave and Wenger, 1991).

Lave and Wenger (1991) describe situated activity with the general theoretical perspective that knowledge and learning have a relational character, a negotiated character of meaning, and a concerned, engaged, and dilemma-driven nature of activity for people involved. According to Lave (1997), “knowledge-in-practice, constituted in the settings of practice, based on rich expectations generated over time about its shape, is the site of the most powerful knowledgeability of people in the lived-in world” (p. 32). When students have the opportunity to engage in discussions with one another regarding their own area of practice, they can learn and discuss their work with one another. An increasing number of educators are moving toward more learner-centered educational models, where students frequently in collaboration with their peers, are engaged in problem solving and inquiry (Barab, Hay, Barnett, & Squire, 2001; Barab & Duffy, 2000; Hay & Barab, 2001; Land & Hannafin, 1996; Roth, 1996).

The synthesis reflected in the activity of participants in the context of understanding-in-practice makes it difficult to argue for a separation of cognition and the social interaction (Lave, 1997). According to Wenger (2009), when technology enables practice, participants are offered a unique perspective because “they are not defined by place or by personal characteristics, but by people’s potential to learn together” (p. 11). Communities often begin with only an initial sense of why they should be engaging and do so with modest technology resources (Wenger, 2009). Wenger (2009) adds that through interaction, the participants continuously reinvent themselves, thereby expanding the understanding of their domain. This leads to the evolution of their practice (Wenger,
2009). Gee’s (2000) affinity spaces describe similar opportunities. In affinity spaces, participants share an allegiance to, access to, and activity in specific practices with others around a common interest (Gee, 2000). Affinity spaces allow participants an opportunity to affiliate around a common cause and the practices associated with espousing that cause unencumbered by “community” (Gee, 2005). Participation or sharing creates and sustains allegiances to those with whom the participants interact (Gee, 2000).

The ability to maintain contact with distant acquaintances both socially and geographically at minimal cost suggests that the internet is a medium through which one can maintain a broader network (Ling and Stald, 2010; Renninger & Shumar, 2002). Online interactions allow users to interact in a more flexible and durable manner (Renninger and Shumar, 2002). Renninger and Shumar (2002) believe the ability to come together with a group online and identify with members of that group creates a new and enhanced sense of possibility for individuals. Researchers have found that through computer-mediated communication, individuals can gain access to ties that can be enriching (Bruckman & Resnick, 1995; Jacobs, 1961; Ling and Stald, 2010; Oldenburg, 1989). According to Ling and Stald (2010), these experiences produce mostly weak ties among participants, but these weak ties provide new forms of input and new creative impulses.

According to Haythornwaite & Kendall (2010), the idea of what defines community and where it is held is continually expanding with many studies of the Internet and community. The notion of what qualities or activities comprise an online community remains malleable (Feenberg and Bakardjieva, 2004; Erickson, 2010). Researchers, according to Erickson (2010), have defined online communities as being
partially imagined (Anderson, 1999; Feenberg and Bakardjieva, 2004), as emergent social forms driven by feelings of commitment (Fernback, 2007), as embodiments of interpersonal communication (Gochenour, 2006), and as groups who are engaged jointly in purposeful activity (Chayko, 2002, 2007; deSouza & Preece, 2004). Such diversity in descriptions, according to Erickson (2010), “confirms the need for continued research on this topic” (p. 1195), especially with regard to what types of interactions constitute communal ties of group identity and what social structures might help to enhance the understanding of today’s collective activity online. According to Ling and Stald (2010), studies of the kinds of ties and relations that make up network or group interaction are of interest to many studies of the Internet, especially how full or partial online interaction transforms, extends or augments such relations.

1.9 Definitions of Terms

Cross-level peer mentoring involves “inequalities between participants based on existing differences such as level of achievement, degree of preparedness for study or level of study” (Falchikov, 2001, p. 36). According to Falchikov (2001), examples of cross-level peer tutoring include supplemental instruction (SI), mentoring, proctoring or personalized system of instruction (PSI), or parrainage (a buddy system). Falchikov (2001) describes parrainage as a system where students counsel other students to help students adapt to a new educational environment. Mentoring is the relationship between a less experienced student and a more experienced student (Falchikov, 2001). Activities in peer mentoring and tutoring generally entail helping other students on a one-to-one basis or in small group settings (Colvin, 2007). Examples of peer tutoring and mentoring
range from content-related help to helping students acclimate to new institutions or aiding high-risk students (Colvin, 2007).

Wenger (1998) emphasizes that communities of practice are the social fabric of learning. Communities of practice, as defined by Wenger (1998), involve: the negotiation of meaning, the preservation and creation of knowledge, the spread of information, and the existence of a home for identities. Lave and Wenger (1991) emphasize learning in communities of practice as a social act, which should be further developed through gradual and increasing interaction in a community of practice. Barab, MaKinster, et al. (2003) describe a community of practice as “a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise” (p. 5). Barab and Duffy (2000) describe four features as present and requisite to a community of practice. These include: (1) a significant history that suggests an overlapping cultural and historical heritage (Wenger, 1998), (2) a shared cosmology with regard to shared goals, practices, and belief systems (Brown & Campione, 1990), (3) the formation of a collective whole (a community) as participants work toward the joint goals of the group and of individual members (Lemke, 1997), (4) constant reproduction and evolution, where new members contribute, support, and eventually begin to lead the group and move from peripheral participants to core members through enculturation (Lave, 1993). Barab, MaKinster, et al. (2003) added that “communities of practice include a common practice or mutual enterprise, opportunities for interaction and participation, meaningful relationships, and respect for diverse perspectives and minority views” (p. 495).
1.10 Summary

This study aims to determine how online mentoring sites have developed through the interactions of undergraduate students enrolled in an online teacher education program. Chapter One provided a brief background and introduced the purpose and significance of this study. Additionally, this chapter presented an overview of the research questions and the inquiry approach that is used to address those questions. The literature review in Chapter Two provides a discussion of the relevant theory and research regarding this topic and presents a framework and context for this study. The next chapter expands upon the literature supporting this study.
CHAPTER TWO: REVIEW OF THE LITERATURE

Chapter Two builds the contextual framework for this study by incorporating the relevant research and theories that are key sources for understanding the topic and the research questions of this study. This review of the literature compiles research regarding community of practice and situated learning theories. Literature concerning theories of online learning, characteristics of the online learner, peer interaction, and peer mentoring in educational programs are included to demonstrate pertinent aspects relevant to this study and its locale. This foundational material will provide perspectives with regard to key factors that exist in online learning environments where students gather, communicate with one another, and share experiences using computer media. Additionally, social presence and social networking are included to provide information on how students interact socially and the knowledge building that emerges through such interaction.

This literature review has been organized into the following sections: online learning, online social networks, peer mentoring, community of practice, and situated learning theories. Within this framework, the research questions are situated. The online learning section provides an understanding of the contextual factors of this medium in higher education and an overview of student experiences in the online learning environment. This section includes differences that highlight the online learner and program needs. The online social networks section provides a summary of the ways of identifying patterns of communication in online environments. The conceptual and historical discussion of peer interaction and peer mentoring in schools provides information regarding the benefits established for students. Moreover, this background
highlights the areas which may need further development. The community of practice and situated learning theories provide background and conceptualization of such systems and the ways in which students can learn from one another in such settings.

2.1 Online Learning

Information technologies are making critical and unprecedented contributions to society (Brown and Duguid, 2000). Faxes, e-mail, personal digital assistants, the Internet -- literally, the World Wide Web -- are being enhanced by the microchips and invisible processors that make phones easier to use, cars safer to drive, appliances more reliable, utilities more predictable, and many things more accessible (Brown and Duguid, 2000). People are using the Internet in diverse ways, expanding the range of social interaction occurring online (Kling, 2000). Technology and the connective power of the Internet have made online learning (distance education) a growth industry, enabling schools to have more diverse and far-reaching audiences while changing the very nature of teaching and learning (Rovai, Ponton, & Baker, 2008).

The Internet provides a rich learning environment where information can be stored and archived, networks can be broadened and developed, collaborations can occur, and information disseminated (Falk and Drayton, 2009). The Internet can be a locale where social activity and creativity translate into meaningful friendships and relationships (Katz and Rice, 2002). People can “access a community of colleagues to discuss, comment on, and critique the value and applicability of the research” as well as role and project models, collegial support in the face of challenges, and a pathway to communicate one’s work to a larger audience (Falk and Drayton, 2009, p. 32). The
Internet and other electronic media serve as "systems of conduits of knowledge" (Wiszniewski and Coyne, 2002).

Since its inception, the internet has been a mechanism allowing for archived exchanges, information, and so on, which have been useful to people over time (Renninger and Shumar, 2002). With the internet, people "can communicate over great distances" and share images, diagrams, and pictures (Renninger and Shumar, 2002, p. 11). There is also the ability to archive information when one is using the internet (Kollock, 1999; Smith & Kollock, 1999). According to Renninger and Shumar (2002), these types of exchanges may account for the unique levels of intimacy that people have been able to reach online, in contrast to those people have been able to reach in face-to-face settings. The internet has allowed for a complexity of discourse not available in physical communities, such as discussions emerging from previous discussions and concurrent discussion formats such as IM or web-based synchronous chats (Renninger and Shumar, 2002).

With the inception of online higher education degree completion programs, positive improvements for learning and instructional opportunities have emerged using this platform. There have been great strides in online course development, teaching, and evaluation that have contributed to the academic success of students, instructors, and programs. These strides have brought an increase in online course offerings, program development, and course enrollment. The successful development of several educational programs and courses in the online format has provided momentum for other educators to offer traditionally face-to-face programs in the online format.
The setup of online courses is generally asynchronous, with instructors providing content material to students, assignment of readings, projects, reflections, papers and/or exams. Some online courses have synchronous components, which may consist of scheduled meeting times, where the students and instructors log into the course together for a specified amount of time for a particular purpose (Meyer, 2006).

Smith, Ferguson, & Caris (2003) found that online courses lead to an unbiased classroom environment, where all parties, i.e. both instructors and students, tend to be more objective in these types of courses. In online interaction, the instructor and students “communicate on a more equal footing where all power dynamics of the traditional face-to-face classroom are absent” (Smith, Ferguson, & Caris 2003). According to Ferdig & Roehler (2004), online conversations in Web-based learning environments can positively impact teaching and learning. Online conversations consist of interactivity, active learning, teacher/student relationships, the building of higher order thinking skills, and flexibility within the online learning environment. For example, students and instructors have the opportunity to reflect upon discussion postings before submitting them. This allows the student to ensure that s/he is comfortable with the posting and confident that the statement accurately reflects the intended contribution (Ferdig & Roehler, 2004). In online learning environments, Smith, Ferguson, & Caris (2003) found the discussions to be broader and deeper, where students were more actively engaged with both their peers and instructors.

In online learning environments, Zhu (2006) has found that students and instructors can voice their opinions, analyze peers’ comments, and reflect on their own learning in electronic discussion settings. These activities help to increase
“interpsychological and intrapsychological activities to promote an individual’s cognitive development and growth” (Zhu, 2006, p. 453). “Online discussions with interaction among students and the instructor facilitate information sharing, knowledge construction, and achieving other learning goals” (Zhu, 2006, p. 475). Through interaction, students learn to rely on each other for support and guidance while enhancing a sense of teamwork and collaboration (Meyer, 2006). Ultimately, Meyer (2006) believes that the use of discussion forums increases interactivity in classrooms.

Researchers are finding that online enrollments are significantly outpacing overall higher education student enrollment rates in the United States (Betts, 2008; Allen & Seaman, 2006; Parker, 1999; Carr, 2000). Research suggests that attrition in online courses remains higher than face-to-face settings (Betts, 2008). Online attrition rates among researchers range from 20% to 80% (Betts, 2008; Dagger & Wade, 2004; Flood, 2002; Diaz, 2002; Frankola, 2001). According to Tinto (2006), overall rates of persistence in higher education have increased to 64.9% from 63.2%. Diaz (2002) concedes that the higher drop rates in online higher education programs may be an accurate reflection of a fundamental difference in outcomes between online and traditional educational environments, but this is not necessarily indicative of academic non-success. Diaz (2002) found student retention and attrition in online programs to be affected mostly by student characteristics (i.e., demographics, learning styles), the quality of the class or its instruction, the course's discipline, socioeconomic factors, disabilities, or apathy. This implies that many factors not related to an institution of higher education can contribute to student retention and attrition.
2.2 Online learners

With the emergence of the Internet and online learning opportunities, many people, who previously were unable to attend college or return to college-level learning, found opportunity to return to school. The learners enrolling in online programs bring a more diverse and broader population of students to the undergraduate roster, creating a new category of learner (Herbert, 2006). According to Herbert (2006), this new type of learner is quite different from the traditional on-campus student, who attends a college or university immediately after high school. This new type of learner did not have characteristics found in the traditional on-campus student population (Halsne & Gatta, 2002 and Herbert, 2006) and researchers are finding high attrition rates for the online learners (Frankola, 2001; Diaz, 2002).

According to Haythornwaite (2002) new computer-supported learners face extra challenges than students in traditional, face-to-face campus settings. The online learning environment differs from the face-to-face experience in several ways, one of which being the absence of student body language or physical cues (Haythornwaite, 2002). The online learning environment is distinguishable from the face-to-face experience in that students form relationships with one another in new ways. In online environments, students do not have the opportunities to simply chat with other students seated to their left or right in the minutes prior to the start of a course or lecture.

Online students are generally older, have completed more college credit hours and more degree programs, and have a higher all-college prior GPA than their traditional counterparts (Diaz, 2000; Gibson & Graff, 1992; Thompson, 1998). Adjustment to the online learning environment occurs while the learners balance the responsibilities of their
work, home, and school lives (Haythornwaite, 2002). In cases of student trouble, the
students (themselves) must reach out and contact someone if they meet a challenge.
According to Haythornwaite (2002), this differs from the face-to-face schooling that
these students may have previously experienced. Each and every contact with the
program must be maintained by the student, therefore the program should be designed to
consider and support student adjustment to this new way of interaction and management
of these responsibilities.

Richardson (2003) provides useful insight into the needs of the online learner and
gives much needed guidance in the planning and development of online learning
programs and infrastructure. Given that students learn differently, there is an obvious
need for online instructors and designers to better understand how the various learning
strategies, motivation, and prior experience of students intersect within the online
environment. Correspondingly, the online instructors and designers’ understanding of
these different needs could then serve as a catalyst for incorporating changes to the
instructional design of courses to improve student learning (Richardson, 2003). Falk and
Drayton (2009) advise that administration, facilitation, and moderation all affect the tone,
dialogue, and development of online network activity.

Despite the above positive issues of concern, studies of online learning
environments have identified feelings of isolation among learners as a possible hindrance
to effective achievement in these settings. Howell, Williams, and Lindsay (2003) noticed
feelings of isolation when working with programs that operate strictly online without any
face-to-face time. Studies have shown isolation affecting satisfaction, motivation, and
longevity in an online learning environment (Howell, Williams, and Lindsay 2003).
Howell & Jayaratna (2000) found that many students feel isolated and lonely during their participation in online courses because of the geographical distance.

Another issue impacting online learning is the notion of “transparency”.

Transparency constitutes the cultural organization of access (Lave and Wenger, 1991), applying not only to technology, but to all forms of access to practice. Transparency enables greater visibility in the organization of activities by allowing a learner to see the inner workings of a component or artifact in the learning system that is available for participant viewing (Lave and Wenger, 1991). Transparency “always exists with respect to some purpose and is intricately tied to the cultural practice and social organization within which the technology is meant to function” (Lave and Wenger, 1991, p. 102). The technology, according to Lave and Wenger (1991), fulfills a mediating function. It can, for example, allow for information flow and conversations in a context where they can make sense. Finding a comfortable level of transparency in online programs may not be as easy for students to uncover as it can be in a face-to-face setting. The level of view can become further transparent or can remain opaque.

The Internet as a social medium has a tremendous amount of potential to create social groups and community interaction among learners (Katz and Rice, 2002; Rice, 1987). The Internet allows one to express his or her identity and belong to a group (Wiszniewski and Coyne, 2002). In this way, the Internet, establishes a setting of togetherness, i.e. a place where one can pursue his/her own interests. Through this togetherness, creativity and connections emerge as a result of the determination to reach individual goals such as friendship, knowledge building, achievement of career or academic goals (Katz and Rice, 2002, p. 200). There is much research regarding Internet
communication and its complement of real-world social relations (Katz and Rice, 2002). In their research, Aviv, Erlich, Racid, & Geva (2003) argue that social relations control the learning outcomes, particularly the knowledge construction process. This corresponds with the concept of social presence, which is “the degree to which a person is perceived as real in the mediated communication” (Richardson and Swan, 2003). Gunawardena and Zittle (1997) demonstrate that social presence is both “a factor of the medium and of the communicators and their presence in a sequence of interactions”. Gunawardena and Zittle (1997) argue that online students can create social presence by projecting their identities into the learning environment through engagement and interaction. Social presence has come to be viewed as the way individuals represent themselves in their online environment (Lowenthal, 2009).

The connectivity in online environments differs from that of face-to-face class settings, especially in asynchronous, online learning formats. Falk and Drayton (2009) view audience size, historical context, levels of intimacy, relationships, and discussion content to affect the way people communicate in online course settings. For example, one may speak more openly about a challenge with a close colleague, whereas in a larger group setting, one may provide the situation in a more formal context with fewer details (Falk and Drayton, 2009).

Asynchronous online learning networks can make the process of collaboration more transparent due to the visibility of the roles and contributions that individuals make (Smith, Ferguson, & Caris, 2003). Greater transparency can be attributed in part to the nature of archiving in an online setting. Specifically, contributions by both students and faculty can be reviewed and re-read multiple times in their context. This enables
continued and unlimited access to historical discussions for the duration of a course. Online discussion interaction can increase student participation and involvement because each student has a voice in this environment (Chong, 1998; Williams et al., 2001).

An asynchronous learning environment provides all of its members the chance to participate in class discussions equally. This equality promotes a democratic opportunity for all students in online settings to participate equally. Correspondingly, this democratic opportunity enables students to connect with one another possibly producing stronger one-on-one relationships than in face-to-face class settings (Smith, Ferguson, & Caris, 2003). However, two factors have led to criticism of text-based, online communication: (1) extraneous social conversation, and (2) technology constraint (Schlager, Fusco, and Schank, 2002). Schlager, Fusco, and Schank (2002) suggested these two factors may negatively impact student participation and dialogue in online learning environments.

Haythornwaite (2002) believes that online interaction, communication, and learning differ from the face-to-face learning culture in that the former does not allow for the rapid conversation exchanges and live, social encounters that typically occur in hallways and that have become part of the face-to-face learning experience. In online environments, students do not have the opportunities to simply chat with other students seated to their left or right in the minutes prior to the start of a course or lecture. These types of communications have become characteristic of the community building among students in a face-to-face environment. Correspondingly, students have come to expect that these types of experiences will be the primary means of community building with their in-class peers. Online communication, as predominately text-based requires student adjustment away from the traditional approach of in-class community building.
Schlager, Fusco, & Schank (2002) note that conventions must be relearned in online discourse. Online learning, without the live classroom meeting, allows a student's physical cues to go undetected. Online communication can be more conducive for a less assertive student in that work and communication can occur in a physical environment that is suited to them, e.g. home or office (Smith, Ferguson, & Caris, 2003). For the shy or self-conscious student, the online setting may allow that student to feel less exposed or vulnerable when participating, posing questions to the instructor, or contributing ideas to the class (Constant, Kiesler, & Sproull, 1996; Finholt & Sproull, 1990; Garton & Wellman, 1995; Hiltz, Johnson, & Turoff, 1986; Kiesler & Sproull, 1992).

Even though online settings offer many commonalities with offline communities, questions still exist regarding the maintenance of ties through media that are unable to transmit the verbal and nonverbal cues that enhance trust and commitment (Haythornwaite, 2002). Further study of online settings and student interactions could aid in better understanding the needs of this population so that they may maximize their educational opportunities.

2.3 Online Social Networks

Katz and Rice (2002) have proven that the Internet allows people to “create and maintain new social relationships” (p.285). With a pedagogical and theoretical interest in social-cultural views of learning, talk as interaction is a mediator toward advancing thought on an individual level and developing community by establishing accepted discourse, history of experience, and shared purpose (Ferdig & Roehler, 2004; Schlegoff, 1991). Social networking analysts believe that the nature of resource exchange and
learning between individuals may indicate the connectivity of members in a social system (Haythornwaite, 2002).

Social network experts analyze the ways in which individuals exchange resources and how these exchanges create connectivity among all members of a social system (Haythornwaite, 2002). From the social network perspective, “the concept of a group, a community, or other collective can be assessed empirically from behaviors among network members rather than from external criteria” (Haythornwaite, 2002).

Haythornwaite (2002) describes the importance of assessing online communities without the resort to labeling them based on external criteria such as geographic proximity. According to Haythornwaite (2002), analysts can look inside such learning situations and examine the types of interactions and social linkages that connect community members. The network-level of analysis allows researchers to look at the composition of networks, e.g. size, homogeneity, and mean frequency of contact, and seek to understand how the properties of the network affect what happens in them (Wellman & Frank, 2001).

According to Koku & Wellman (2002), social network analysis emphasizes the importance and patterns of relationships among interacting units, such as people and organizations. The social network analysis approach enables analysts to go beyond viewing relationships solely in terms of groups or isolated units (Koku & Wellman, 2002). Researchers have found that when relationships are analyzed in terms of social networks, analysts can examine the social contexts of online relationships and focus on the potential of computer-mediated communication to support less-bounded, sparsely-knit interactions (Fulk et al., 1987, 1995; Koku & Wellman, 2002; Rice, Grant, Schmitz, & Torobin, 1990; Wellman & Giulia, 1999; Wellman et al., 1996). When viewing online
settings as comprised of networks of relations, analysts can examine the types of interactions, e.g. information, emotional support, material support and companionship that affect online groups (Koku & Wellman, 2002).

Basic principles of social networking can provide insight into and assistance in identifying the patterns of communication in an online course setting. Interaction and information exchange among learners in online discussion settings help form specialized social networks, which connect a group of learners in order to achieve specific learning goals (Zhu, 2006). According to Zhu (2006), the network “contains and is sustained by exchange of information and by interaction among members” (p. 454). Additionally, a social network comprises individuals with whom a person has some sort of regular and sustained contact (Fahy, Crawford, & Ally, 2001; Ridley & Avery, 1979; Zhu, 2006). Online discussion messages are examples of learning, which demonstrate student behaviors that can deconstruct the learning process (Zhu, 2006).

In online course settings, researchers have applied the social network perspective to discussion forums (Meyer, 2006; Chong, 1998; Williams et al., 2001). The interactions in discussion forums can embody the highly complex processes between participants involving questions, explorations of information, construction of possible solutions, and a resolution of the problem or question (Meyer, 2006, Romiszowski & Ravitz, 1997). Alternately, interactions can be as simple as providing feedback (Meyer, 2006, Romiszowski & Ravitz, 1997), making connections (Meyer, 2006, Romiszowski & Ravitz, 1997), or reflecting on others’ opinions (Meyer, 2006). Social network analysis can be useful in such settings as it allows researchers to analyze the ways in which
individuals exchange resources and how these exchanges create connectivity among all members (Haythornwaite, 2002).

According to Renninger and Shumar (2002), interaction and communication are central to the learning process. “In social learning, process, thought, and knowledge involve the re-imagination of the individual’s identity as well as the re-imagination of the knowledge community” (Shumar, 2009, p. 93). According to Renninger and Shumar (2002), the internet provides a communicative space that is multilayered and allows users to intermingle different conversations that have an infinitely renewable life. Whether spoken or written, these conversations alter previous interactions. According to Bakhtin, (1986) utterances always obtain meaning within some specific social interaction. The meanings are shifting as the interactions shift (Bakhtin, 1986).

Oren, Mioduser, & Nachmias (2002) describe social aspects of Internet communication as facilitating the development of unique forms of interpersonal and group interaction. As social behavior is a natural human need, it is also an important part of the learning process (Oren, Mioduser, & Nachmias, 2002). As Vygotsky’s (1978) sociocultural theory states, meaning develops through the social process of language use over time. Interaction is one of the most important components of teaching and learning (Moore, 1993; Vygotsky, 1978; Zhu, 2006). Zhu (2006) believes that learning is more predominant “when it is in the form of a dialogue where learners can interact with peers or mentors who challenge and scaffold their learning” (p. 453). Additional sociological research suggests that learners use socially mediated and intellectual tools to achieve cognitive development (Rogoff, 1990).

The way in which people engage each other was described by Scollon and
Scollon (2004) as discourse. Discourse can be “dialogue involving the assessment of beliefs, feelings, and values” (Mezirow, 2003, p. 59). Mezirow (2003) believes this to involve assessing the point of view of a particular frame of reference in relation to the context to which it is applied. This process becomes more complex when one attempts to understand the reference of another. According to Mezirow (2003), understanding is dependent on the nature and goal of a situation and its social relationships. Qualities of emotional intelligence, such as self-awareness, impulse control, persistence, self-motivation, empathy, and social deftness (Goleman, 1995) are beneficial in assessing alternative beliefs in a social context. According to Mezirow (1997), through discourse “we learn together by analyzing the related experiences of others to arrive at a common understanding that holds until new evidence or arguments present themselves” (p. 7).

Talk (Ferdig & Roehring 2004; Schegloff, 1991), dialogue, or discourse is a tool mediating the advancement of thinking for individuals as well as developing community through the establishment of accepted discourse, history of experience, and shared purpose (Ferdig & Roehring 2004; Rogoff, 1995; Vygotsky, 1978; Wertsch, 1991). Lave and Wenger (1991) study discussion as a learning process. They believe that discourse production is a social and cultural practice, where discussions in learning communities should be evaluated equally with other forms of assessment (Lave and Wenger, 1991). Learning is a way of being in a social world, not a way of coming to know about it. Social language is the conduit for meaning making (Vygotsky, 1978). The learners, according to Lave and Wenger (1991) are engaged both in the contexts of their learning and in the broader social world within which these contexts are produced. Wegerif (2006) found that the space of a dialogue is a place where when one becomes acclimated
can lead to an increased capacity for creative thinking and problem solving. When solving a problem in a dialogic space, there is a potential for the sharing of multiple perspectives at once (Wegerif, 2006). According to Wegerif (2006), tools in computer environments can be used to open up and maintain dialogic spaces, which can lead to real dialogue across cultural and geographic differences using the internet in asynchronous and synchronous formats.

The ability to come to identify with a group online, and support to do so, actually provides a scaffold for a different and enhanced sense of possibility for individuals (Renninger & Shumar, 2002; p.2). When people come together with other like-minded people, they can come to share a common identity and may form attachments to meet new needs (Renninger & Shumar, 2002, 2004; Shumar, 2003; Shumar & Renninger, 2002; Shumar & Sarmiento, 2008). In the virtual community, relationship is typically defined not by proximity but by contents of individual interest – classes of objects, ideas, or events about which participants have differing levels of both stored knowledge and stored value (Renninger, 2000; Renninger & Shumar, 2002).

Individual interaction can be understood as an ongoing construction and revision of contributions by other participants framing the shared understanding of norms or structures (Davies & Harré, 1990). Utterances and interactions communicated using the Internet are understood through intentions and inferences based on information that may be archived or obtained by individual’s interest (Renninger and Shumar, 2002). According to Renninger and Shumar (2002), “this process not only constantly redefines more traditional notions of the individual but also the meaning of what individuals say and the work they do together” (p.12).
Further study of the formation of different networks in online settings can assist in understanding the patterns of student behavior in online communal groupings (Renninger & Shumar, 2002). Such study will also serve to uncover the categories and forms that these networks assume, the content and characteristics of the interactions that contribute to the development of these networks, and the patterns that form as new members mature with the group and then provide guidance and advice for newcomers.

2.4 Situated Learning

The concept of situated learning explores the positioned character of human understanding and communication with a focus on the relationship between learning and the social situations where the actor(s) engage together (Lave and Wenger, 1991). Lave and Wenger (1991) categorize learning in certain forms of social coparticipation, where social engagements provide the proper context for learning to occur. The premise is that the learner(s) acquires the skill to perform by engaging in the process (under the attenuated conditions of legitimate peripheral participation). “Legitimate peripheral participation with a core concept of relations of learning places the explanatory burden for issues such as ‘understanding’ and ‘levels’ of abstraction or conceptualization not on one type of learning as opposed to another, but on the cultural practice in which the learning is taking place, on issues of access, and on the transparency of the cultural environment with respect to the meaning of what is being learned” (Lave and Wenger, 1991, p. 104-5). Lave and Wenger (1991) have found that participation is neither more nor less abstract or concrete, experiential or cerebral, than in any other.

As Lave and Wenger (1991) have concluded, understanding the path of process, where there is participation in a situated learning environment affords researchers with
“an unexplored set of interconnections of activity and activity systems, and of activity systems and communities, culture, and political economy” (p. 122). Lave and Wenger (1991) believe that learning in general consists of the intersection of meaning, understanding, and knowledge creation. These facets are all contained within active contexts, not self-contained structures. Through experience, a person encounters and realizes some aspect of the world in a new way and/or finds new meaning in this aspect of the world (Dewey, 1934/1958). It is the participants in the learning context, or the community, who emerge from the environment with a learning experience (Lave and Wenger, 1991). Therefore, learning is a process that takes place in a participation framework or interactions, not in an individual mind (Lave and Wenger, 1991).

Lave and Wenger (1991) believe that learning is an integral and inseparable aspect of social practice; they characterize it as legitimate peripheral participation, which is the concept that “learners inevitably participate in communities of practitioners and that mastery of knowledge and skill requires newcomers to move toward full participation in the sociocultural practices of a community” (p.29). In Lave and Wenger’s (1991) research, situated learning “took on the proportions of a general theoretical perspective, the basis of claims about the relational character of knowledge and learning, about the negotiated character of meaning, and about the concerned (engaged, dilemma-driven) nature of learning activity” for those involved (p. 33). This perspective implies that there is no activity that is not situated, therefore, the emphasis moves to the entire person, their activity in and with the world, and to the view that the agent, the activity, and the world mutually inform each other (Lave and Wenger, 1991).
Dewey’s (1934/58) definition of an experience as an expansion of perception and value supports this claim.

"The generality of any form of knowledge always lies in the power to renegotiate the meaning of the past and future in constructing the meaning of present circumstances (Lave and Wenger, 1991; p. 34). As Dewey (1902/1990) states, the subject matter needs to be psychologized; turned over, translated into the immediate and into a perspective for the learner(s). Situated learning acts as a bridge between the cognitive processes of learning and social practice, where learning to become a participant in his or her own right in a community involves learning how to talk and exist in the manner of full participants (Gee, 1999; Lave and Wenger, 1991; Jordan, 1989). Dewey (1916/1980) describes learning as a cycle of disequilibrium and restoration of equilibrium, where learning, inquiry, and growth are the activities included in the process. Scheckler and Barab (2009) describe learning as a process of inquiry and as a process of doubt, which is followed by the search for solutions to resolve the doubt in a cultural-historical context (situation), which transforms the situation.

Learning is done collegially and socially through interactions with others and is mediated by the differences of perspective among coparticipants (Lave and Wenger, 1991). Lave and Wenger (1991) believe that meaning, understanding, and learning are all contained within active contexts, not self-contained structures. As Sfard (2008) surmises, the processes of thought and interpersonal communication are joint endeavors. The term commognition encompasses the unity of these two processes (Sfard, 2008). The theory of commognition includes communication as a patterned, collective activity that involves a repertoire of permissible communicational actions among individual
members, and for every action, a repertoire of permissible reactions of other individuals (Sfard, 2008). Sfard (2008) theorizes that human discourses, due to their recursivity, “gradually grow in complexity and support incessant, accruing transformations in other human activities” (p. 115). Hoadley and Pea (2002) demonstrate how social context is interwoven with the finding of information. People communicate to express themselves, to transmit information, and to learn (Hoadley and Pea, 2002). With these expressions come acculturation (Hoadley and Pea, 2002), and through this process, “knowledge and culture are perpetuated and transformed as we interact, define new problems, and take on new challenges” (p. 323).

2.5 Community of Practice

Brown and Gray (1995) have come to define small groups of practice held together by common purposes and the necessity to know what the others in the group know as communities of practice. Stahl (2006) describes communities of practice as containing “work defined by social practices that are propagated through socialization, apprenticeship, training, schooling, and culture” (p. 100). Communities of practice can be located within an organization or span a discipline, having members from multiple organizations (Stahl, 2006). In a community of practice, learning opportunities occur primarily through informal interaction among colleagues in a context of work (or study) (Schlager, Fusco, and Schank, 2002). Practice is “in the sense of Bourdieu’s concept of habitus (Bourdieu, 1995), the set of generally tacit procedures that are culturally adopted by a community” (Stahl, 2006, p. 138).

Learning is a practice. Engaging with others helps to form the families of practice that allow the ideas to take hold in people’s repertoires (Lave and Wenger, 1991). The
result is an enriching experience where the participants learn from other perspectives (Tinto, 2006). “Legitimate peripheral participation” provides a means to determine how the theory of social practice (which includes learning) aids in the thought development and the newcomer advancement in the community of practice (Lave and Wenger, 1991). Lave and Wenger (1991) have shown that, in a community of practice, experienced members provide guidance to newcomers and moderately-experienced members through their interactions and example.

Wighting, Liu, & Rovai (2008) found two important factors affecting distance learning, i.e. the sense of community experienced by the students in the environment and the motivation level of students to learn in an online environment. “A sense of community is important for all learners, whether they be online or face-to-face students” (Wighting, Liu, & Rovai, 2008). Royal and Rossi (1997) described a community, placing emphasis on friendship as a proponent of a spirited community of learners. This type of community is a learning environment with teamwork, diversity, and where participants care about, trust, and respect each other (Royal and Rossi, 1997). A social community can provide feelings of trust, cohesion, safety, a sense of belonging, and interdependence to its members (McMillan & Chavis, 1986). The development of student-to-student and instructor-to-student relations all aid in the development of trust and social support, creating strong ties in a group or network (Haythornwaite, 2002). The learning community can extend to its members opportunities for the sharing of group values and the extent to which the participant’s educational goals are broadened through their membership (Wighting, Liu, & Rovai, 2008).

Research in the field of Computer-Supported Collaborative Learning (CSCL)
explores diverse learning contexts ranging from single instances of collective problem-solving to the development of online knowledge-building communities over time (Sarmiento and Shumar, 2009). According to Sarmiento and Shumar (2009), CSCL arrangements are “joint activity spread over time and across multiple collectivities”, which present to co-participants the challenge of overcoming a wide range of gaps including, for example, those related to the activities of multiple participants, the coordination of multiple sessions of work, and the monitoring of various ideas and topics (p. 1).

According to Renninger and Shumar (2002), “virtual communities involve a combination of physical and virtual interaction, social imagination, and identity” (p. 2). Online interactions allow users to interact in a more flexible and durable manner (Renninger and Shumar, 2002). Renninger and Shumar (2002) believe that having the ability to come together with a group online and identify with members of that group allows for a scaffold for a new and enhanced sense of possibility for individuals.

In online learning networks, Haythornwaite (2002) found that the formation of groups within a network play an important role in their ability to allow students to pass information amongst each other. Peers can be of great help in a community of practice (Bruckman, 2002). Similarly, Lave (1997) describes apprentice-style learning as affording newcomers, apprentices, or novices an opportunity to acclimate and learn the activities needed to develop a practice. Through participation, the learners have the chance to learn from the knowledge and experience of others, yet develop a style of practice that may be uniquely their own (Lave, 1997). This has great implications for the
basis of this research study and support for students to learn from one another in practice, especially novice from expert.

Lave (1997) had observed math learners, who had opportunities to work with their peers seventy-five percent of the class time (while an instructor observed and facilitated as needed) and received direct instruction twenty-five percent of the time. These learners, Lave (1997) noticed, worked together, came to agree upon the focus of their activities, and invented procedures that worked best for them and the completion of problems. Additionally, there was collaboration, students helping other students without being asked, and the sharing of tools or resources that had been helpful (Lave, 1997). The results of their work over a three-week period produced errorless assignments using methods that were not presumed to be known by the students and were not supposed to be in use (Lave, 1997). The students used tools or methods that they knew from experience in another area or used intuition to solve problems. This suggests that when learners are given opportunities to discuss their experiences, share their questions and problems, and learn from each other that often unexpected, positive outcomes can emerge.

In their work together, these students formed a solid group of respectful and collaborative learners. In observing these students, Lave (1997) noticed the knowledge that emerged from trial and error and from each person’s part in the process of developing and learning more about the practice. In both instances, the non-traditional learners had the opportunity “to develop a practice from the multiple and varied (but not infinitely varied) circumstances of their activity” as it progressed each day (Lave, 1997, p. 27). This way of learning leaves room for creativity and for the contributions of the
learners in developing and creating their learning together through trial and error, intuition, and prior experiences.

In traditional schooling, teachers specify the practice to be learned, children then improvise on how to produce the practice, but never take part in the practice itself (Lave, 1997). The more that teachers, the curriculum, textbooks, and lessons take ownership of the problems or decompose steps pushing students away from owning the problems, the harder it is for the learners to develop (Lave, 1997). Instead of promoting student ownership of problems, educators often envision that students are subsumed by educational problems. Apprentice-style learning, or learning in practice, reverses this thinking by emphasizing that children or learners have the opportunity to develop meaning about things they are learning (Lave, 1997). More specifically, the learners’ “understanding (giving significance to, and critical analysis of relations of the subject to other aspects of the life world) encompasses and gives meaning and value to the subject matter, the process of learning it, and its relations with the learners’ life and activity more generally” (Lave, 1997, p. 33-4).

A community of practice can help members facilitate ideas and help novices learn through apprenticeship and through peripheral participation (Schlager, Fusco, and Schank, 2002). New and potential members of a community have to know how to access the virtual community, access software, and be a member in good standing (Nolan and Weiss, 2002). This, Nolan and Weiss (2002), believe is an experiential process both for the novice and the experienced member. A certain amount of watching and observing is necessary to determine acceptable behavior (Nolan and Weiss, 2002).
2.6 Newcomers

In higher education, many first-year students experience isolation and uncertainty when acclimating to their new academic program and the overall college or university environment (Heirdsfield et al., 2008; Cantwell & Scevak, 2004; Dickson, 2000). Researchers have found that first-year students experience challenges, which include adjusting to new technologies, balancing academic responsibilities with other commitments, i.e. home, work, and family, and transitioning to more independence. According to Heirdsfield, Walker, & Walsh (2005), these are factors associated with retention and attrition. Tinto (2009) cites the first-year in an undergraduate program as a critical year, where students need academic and social support in order to succeed.

Learning is a social activity that occurs as newcomers move through an established community’s professional hierarchy to gain expertise in the field (Lave and Wenger, 1991; Brown and Duguid, 1996; Wenger, 1998; Schlager, Fusco, and Schank, 2002). “Habitual forms of activity and interactions with other people reinforce the social norms and pressures on an individual, giving that individual a sense of how the world is structured and that there is power within it” (Renninger and Shumar, 2009).

Haythornwaite (2002) argues that extra efforts must be present in online learning environments to ensure that social support is encouraged and fostered.

2.7 Peer Interaction

Aviv, Erlich, Racid, & Geva (2003) believe that peer interaction has a great influence on success in educational environments. Neville (1999) has found that peer support can have beneficial effects on learner motivations more often than staff support. Similarly, Tinto (2009) has found that students are mostly likely to succeed in settings in
which they are actively involved with faculty, staff, and student peers. For students, peer support is not only technical, but can also be emotional, providing reassurance when a colleague experiences challenges (Bruckman, 2002).

Hoadley and Pea (2002) describe the establishment of social relationships with peers in an online setting to be incubators for learning through collaboration. In online environments, with social support as a cornerstone of a learning environment, acute development of online relations is necessary to foster social relations to promote learning communities (Haythornwaite, 2002). Hoadley and Pea (2002) found that a group of students in a certain study were able to learn from a group of online peers through a structured discussion tool without any access to expert information (p. 329). Peers can often help their fellow students learn by providing or lending information that has been beneficial.

Researchers have found that assistance in online learning environments is helpful in empowering students (Bonk et al., 2004; Falchikov, 2001; McLoughlin and Marshall, 2000). Falchikov (2001) has found such helping behavior to aid in the empowerment of students in online learning and collaborative environments. Scaffolding has been a great aid in helping students prepare for a problem or task with guidance from a more capable expert, teacher, or peer (McLoughlin and Marshall, 2000) by breaking down a concept or experience into manageable information for the receiver. Scaffolds, presented by other learners or peers, can help other students move from one level to another (Jaramillo, 1996). Additionally, scaffolding and facilitation have been found to be positive factors in the development of meaningful online discourse (DeSmet, Van Keer, and Valcke, 2008; Clouston, 2005; Rickard, 2004; McLoughlin and Marshall, 2000; Mercer and Wegerif,
DeSmet, Van Keer, and Valcke (2008) suggest that mentoring relationships can play a beneficial role in online learning, especially through discourse.

2.8 Mentoring

Mentoring along with scaffolding, modeling, and coaching are all methods of teaching and learning, which draw on the social constructivist learning theory (Dennen, 2004). Ways of supporting students in electronic collaborative learning or CMC environments have assumed various forms, which include e-tutoring, online mentoring, e-coaching, e-moderating (Bonk et al., 2004). According to Dennen (2004), these methods promote learning that occurs “through social interactions involving negotiation of content, understanding, and learner needs, and all three generally are considered forms of cognitive apprenticeship” (p. 813). In cognitive apprenticeships, learning occurs as experts and novices interact socially while completing a task (Dennen, 2004).

Mentoring describes the relationship between less experienced persons and more experienced persons occurring in a variety of settings, which include higher education, pre-professional teacher education, and business, to provide guidance, advice, feedback, and support to the less experienced mentee and to encourage personal growth (Falchikov, 1991). A mentor is “one who mediates expert knowledge for novices, helping that which is tacit become more explicit” (Dennen, 2004, p. 817). In learning environments, mentoring allows students to exchange ideas, to learn with others, and to co-construct meanings (Beattie, 2000). Research suggests that guidance and structure may be necessary in order to propagate interactive learning experiences (Bonk et al., 2004; McLoughlin and Luca, 2000).
Although the structure of mentoring programmes varies depending on the target faculty or discipline, these programmes share some key characteristics that appear central to their success. According to Hammer (1981), supportive ties may provide a background level of support that helps carry the individuals through crises if they occur, but more generally provide the individual with support when needed. Haythornwaite (2002) believes that the presence of supportive ties can be activated when needed, helping the individuals to feel supported within a network.

Colvin (2007) has found that peer mentoring is being used in higher education to aid in student learning, motivation, and empowerment. Peer mentoring programmes provide an avenue for new students to be supported by more experienced mentor students and make social connections with other new students (Glaser, Hall, & Halperin, 2006; Muckert, 2002). Peer mentoring research has shown increased motivation among mentees (Carroll, 1996; Falchikov, 2001; Fraser et al., 1977; Millis & Cottell, 1998) and increased learning for students (Fraser et al., 1977; Johnson & Johnson, 1985), as well as learning and empowerment for the mentors themselves (Goodlad & Hirst, 1989; Miller & MacGilchrist, 1996; Entwistle, 1997; Millis & Cottell, 1998; Parkin & McKeegany, 2000). In addition, researchers have found that peers are often considered the most powerful influence in undergraduate education, even more so than advisors and instructors (Duch et al., 2001; Ender & Newton, 2000; Fortney et al., 2001; Garside, 1996; Newcomb & Wilson, 1966). This increases the importance of peer influence and support in helping fellow peers.

One form of peer mentoring is peer tutoring wherein students teach other students (Colvin, 2007). Colvin (2007) describes these experiences as involving those of the same
societal group or social standing where one peer with more experience or knowledge educates and assists the peer who lacks the same experience or knowledge. Topping (1998) defines peer tutoring as tutors providing less experienced tutees with help in a collaborative context. Peer tutoring involves people from similar social groupings helping each other learn and help themselves by teaching (Topping, 1996).

Interchanges in peer tutoring range from formal teaching in the classroom to sharing information in social settings (Colvin, 2007). In general, peer tutors help other students either on a one-to-one basis or in small groups by continuing classroom discussions, developing study skills, evaluating work, resolving specific problems, and encouraging independent learning (Colvin, 2007; Falchikov, 2001; Goodlad, 1998; Saunders, 1992). Forman and Cazden (1985) believe that for peer tutoring to occur the tutors must have more knowledge than the tutees. The two types of peer tutoring are the monitor type, where undergraduates are used as “institutional manpower for prevailing institutional ends”, and the collaborative type, where interdependence and peer influence further educational ends (Bruffee, 1993, p. 83).

According to Wertsch (1991), the principle of co-constructing meaning in collaborative settings parallels Vygotsky’s socio-cultural theory, which outlines that an action is mediated by the environment in which it is carried out and is tied to that environment. In online environments, the demands placed on a tutor or mentor are somewhat different from those in face-to-face settings (Falchikov, 2001; Duggleby, 2000). Maintaining or creating a tie often requires more effort in the online contexts than in traditional face-to-face environments. Isolation, styles of learning and interaction, and levels of visibility of the course structure, dynamics, and progression are factors that may
hinder online learning participants' development and enculturation into the online environment.

Mentoring programs can be structured in various ways. Specific aspects that contribute to effective programs include the characteristics of the mentor, the size of the mentoring group, the presence of a coordinator, and a multidimensional approach to mentoring (Rolfe-Flett, 2000). Colvin (2007) suggests that using more senior university students, rather than academic staff, may yield more successful outcomes. First-year students may be reluctant to approach or question academic staff and have difficulty relating to them (Grob, 2000; Muldoon & Godwin, 2003). Although there is no single mentoring program design that meets the needs of every school in every situation, there is a broad consensus regarding the institutional barriers that can negatively impact the mentoring process between mentor and new teacher (Colvin, 2007).

McInnis, James and Hartley (2000) recommend that peer support and mentoring programmes where more experienced students adopt the role of peer mentors are preferable because they provide more effective support during the first-year transition. "First-year students must adjust to balancing competing deadlines; cultivating interdependence in learning; and developing skills in assignment writing, critical thinking, problem-solving and information technology skills (Pitkethly & Prosser, 2001). According to Dickson (2000), students, whether they are full-time undergraduate students, international students, or students with previous college experience returning from a hiatus, go through an assimilation phase during their first year in an institution. Tinto (1993) contends most students are able to adjust to the institutional life of a new university and find the support of other members of the community helpful. According
to Dickson (2000), some students make significant personal contacts on their own while others need the assistance of formal structures to become involved in university.

With the still relative newness of online educational programs and their persistence rates still below that of traditional face-to-face programs (Tinto, 2006), determining ways to support students is a fundamental goal to aid in the continued growth of these online programs. Research suggests that advising plays a pivotal role in retention and success of online students. Tinto (2006) contends that institutions which retain students take advising seriously, provide clear, consistent, and easily accessible information about institutional requirements, help students understand the roadmap to program or degree completion, and help them understand how to achieve personal goals. Academic persistence occurs in settings that (1) support the academic, social, and personal goals of students, (2) involve students as valued members of the institution, and (3) promote the frequency and quality of contact with faculty, staff, and students (Tinto, 2006). “Students who find support for their learning, receive frequent feedback about their learning and are actively involved in learning, especially with others, are more likely to learn and, in turn, more likely to stay” (Tinto, 2006, p. 2). Additionally, predictors of student persistence matter most during the first year when student attachments are so tenuous and the institution is so new to the student (Tinto, 2006).

Heirdsfield, Walker, Walsh, and Wilss (2008) have proposed that maximizing the use of technology’s convenience and flexibility and creating online mentoring programs to assist new students in acclimating to online programs has been proven to be a good support system for new students in higher education settings. Tinto (2006) has found that first-year students feel uninvolved in higher education settings due to a number of factors.
These factors include (1) passive participation in their learning, (2) completion of courses as detached, individual units, often separate in content and peer groupings, and (3) the view that courses are just a means to their career path (Tinto, 2006). Heirdsfeld, Walker, Walsh, and Wilss (2008) contend that mentoring is an effective and sustainable option in orienting and supporting first-year students in their transition to university study.

Researchers have found that the more engaged a student is within a community, the higher rate of persistence in a program (Betts, 2008; Chickering & Gamson, 1987; Tinto, 1993). Engagement and involvement must be strategic and introduced through instruction and programming to ensure student involvement (Betts, 2008; Chickering & Gamson, 1987; Tinto, 1993). Community building in distance education is important to a successful learning experience, alleviating fears of isolation for both students and faculty members (Betts, 2008).

Colvin (2007) notes that a number of universities have successfully implemented peer tutoring in programs. One such program, LEAP!, a nationally recognized learning community program for first-year students, involves peer tutors, faculty, and students in social and academic settings (e.g., University of Utah, 2006). This program seeks to lay a foundation in which incoming students receive advice and help from more experienced peers in a learning community. The peer tutoring contributions, which range from providing support for other students by being counselors or advisors to being trainers, lend their previous experience in order to help others and to be expert instructors in a tutoring situation (Colvin, 2007). Overall, Goodlad (1998) suggests that ‘involving learners in responsibility for their own and other people’s education, [this involvement] increases social interaction’ (p. 16) and transforms learning from a private to a social
activity.

Most research in this field, however, focuses on peer tutoring with young children (Colvin, 2007; Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Ladd & Kochenderfer, 1996). While some researchers have studied peer tutoring in higher education (Kochenour et al., 1996; Newcomb & Wilson, 1966; Saunders, 1992; Barab & Duffy, 2000), Colvin (2007) has found that the relationships and interactions occurring in higher education mentoring settings are under researched.

Research in face-to-face peer mentoring has been conducted, but online peer mentoring is still a new and developing phenomena. To understand the interactions that occur in online settings, the socialization that occurs in these types of environments, and the impact on student performance and success are beneficial contributions to the research in this field (Colvin, 2007). Colvin’s (2007) research demonstrates the importance of the relationships that are formed in mentoring situations among tutors, students, and instructors. Colvin (2007) suggests that further studies in the socialization occurring in peer mentoring groups in everyday interactions will provide a detailed view of the interactions in mentoring situations and the impact on academic socialization. Colvin (2007) recommends future research regarding qualitative communication in mentoring networks to determine the specific types of discursive lines (Heirdsfield, Walker, Walsh, and Wilss, 2008).

Additionally, research concerning peer mentoring in an online environment will serve to explore the ways in which students interact, their patterns of interaction, the way they exchange information, the development of learning, the support systems they may create, and the community they develop. This will help to determine the types of
interactions students have in an online community of practice created to help newcomers acclimate into a new program and learn from the knowledge and know-how of more experienced students. Additionally, this will determine the benefits of such an online experience for students. Sarmiento and Shumar (2009) noted the importance of understanding the construction of social reality in computer-supported collaborative learning (CSCL). Observations of the roles and interactions in CSCL will broaden the exploration of the way that multiple participants engage in learning and knowledge building over time. Exploring CSCL as it manifests in peer mentoring situations will add to the continuing development of research in this field.

This chapter provides an overview of the relevant research and theories that are key sources for understanding the topics related to online peer mentoring in a higher education environment. The internet supplies a rich learning environment, where collaborations can occur and information can be shared with many people at once. In online environments, learners are able to create social presence to identify and characterize themselves in their learning environments. Interactions promote for the sharing of information and experiences, providing dialogues, and advancing thinking. When students interact in situations with others pursuing the same area of study, career, or with the same interests, they function as a community of practice, a community of support, where learning with someone allows for the co-construction of meaning and for learning to emerge in ways that educators may not have imagined. These interactions provide guidance that may be helpful for one to navigate his/her present situation. When more experienced students or practitioners enter the environment, newcomers have the chance to learn from the knowledge and experience of others. Peer help and mentoring
can have great influence on students, especially in the online environments, which can
be isolating for some. Knowing that someone may have had a similar experience can
provide a supportive force to enhance personal growth, co-construct meanings, and
enhance engagement in academics and professional arenas. Engagement and
involvement also have great potential to aid in retention efforts for colleges and
universities. When social engagement among peers occurs, especially in online learning
environments, dynamic and engaging connections can occur that promote unimagined
learning opportunities for students from various geographical locations, uniting them
around their joint academic interests. Studying the interactions in online community of
practice environments can help to create more settings such as these to allow learners to
learn with others.
CHAPTER THREE: METHODOLOGY

3.1 Overview

Chapter three describes how this researcher will address the research questions of this study:

1.) *How are the first-year and third-year students enrolled in an online undergraduate teacher education program using peer mentoring sites specially crafted to engage new students with more experienced students?*

2.) *What communication patterns emerge from the interactions of students in the online peer mentoring sites?*

3.) *What factors influence the interaction patterns among the students in the peer mentoring sites?*

   a) *What relationships and roles arise from the interactions?*

This researcher used interpretive content analysis and the social network paradigm to address these research questions. This chapter begins with discussion of the Mixed Methods Research Design employed to examine the data and the Justification of this Design Choice (Sections 3.2 and 3.3, respectively). Data examination is explained in sections entitled Site Selection and Sampling Plan (Section 3.6), and Data Collection Procedures (Section 3.7). Section 3.7 provides the Data Collection Procedures. Section 3.8 outlines the Data Analysis Timeline. Section 3.9 provides explanations of the procedures used in analyzing the data in the following subsections: (a) Interpretive Content Analysis and (b) Social Network Analysis. The Reliability and Validity of this study are addressed in Section 3.10, followed by Ethical Considerations (3.11), with a Summary of Chapter Three provided in Section 3.12.

The online mentoring sites as the focus of this study consists of groups of participants communicating in a defined setting (i.e. in the online discussion board) over
a fixed period of time developing, as Rogoff (2003) suggests, “cultural processes”. Rogoff (2003) suggests viewing cultural processes as practices and traditions of dynamically related cultural communities in which individuals participate and to which they contribute across historical periods of time. The focus of these studies should be on people’s involvement to address the dynamic, generative nature of both individual contributions and a group’s practice. According to Rogoff (1995), when analyzing an activity or event there are active and dynamic contributions from individuals, social partners, and historical traditions and materials and their transformations. There is a constant reformulation of the relation between the individual and the social and cultural environments in which each is inherently involved in the others’ definition; none can exist separately (Rogoff, 1995). Rogoff’s theory (2003) of constant reformulation in a culture of practice directly applies to the online peer mentoring sites of this study, as a symbiotic relationship exists between the peer mentoring site and its participating students. As the student participants interact with one another, the group changes as a whole.

Rogoff (2003) suggests that researchers use a lens to view the whole setting under study to ensure that participants, interactions among the participants, background or environment, and the tools or resources used by the participants are included in the analysis. This offers a view of the sociocultural “transformation of participation perspective” in which personal, interpersonal, and cultural aspects of human activity are conceived of as different analytic views of ongoing processes, where the participants and the community mutually exist (Rogoff, 2003, p. 52). Viewing the peer mentoring sites using Rogoff’s perspective allows this researcher the opportunity to gain a holistic and
natural view of the participant interactions and fully how the students interact. As stated throughout this paper, the goal of this study is to understand the ways that online members of a peer mentoring community connect and learn from and with one another as well as through postings and communication in a specially crafted educational setting.

Each peer mentoring site begins with a description of the purpose of the creation of the sites – to allow first and third year students the chance to interact and learn from the experiences of the other participants in the site. The students, through their posts, create the activity and interactions that comprise the peer mentoring discussion boards. The peer mentoring sites are an example of informal information networks (Contractor & Eisenberg, 1990; Haythornwaite, 1996). These networks form and reform as the needs of the participant and potentially the environment change, which results in a constantly emerging network (Haythornwaite, 1996).

In the constantly emerging network, informal information routes develop based on the local needs of the participants (Haythornwaite, 1996). Locating these routes and defining the groups and roles that arise to respond to the needs allows for the determination of who assumes what roles in these settings, who turns to whom for support, and what patterns these actions create. Understanding the emergent patterns and the ways in which they developed provides a better understanding of the student needs, questions, concerns, understanding, and support systems in the undergraduate, teacher education program.

This study used social network analysis to create sociograms for the peer mentoring sites of the 2008-9, 2009-10, 2010-11 academic years. These sociograms showed the interaction patterns of the students in the site based on direct communications
from one actor to another actor in these settings. The sociograms also displayed attributes of each participant in aggregate form. The attributes included gender, race, age, geographic location, and program status. The attribute information provided more details regarding the formation of connections among the participants, further addressing research question two. Additionally, the attributes provided information regarding each actor that may not be included in the discussion board interactions. Having such information for each student allowed this researcher the opportunity to see commonalities or patterns that emerge. This addresses research question three.

The interpretive content analysis as applied to the discussion board posts provided insight into the direct connections that the students have established, what causes them to reach out to one another, ask for help, and support one another in these settings. This analysis also included the examination of the posts that students post directly to the entire population of students. These posts are not included in the social network analysis because they are not directed to one or more particular individuals. The interpretive content analysis provided insight into the conversations that emerge by reviewing and reporting on the content of the directed communications of these networks. The interpretive content analysis provided detailed description regarding the patterns that emerge in these directed communications, activity that propels or contributes to these patterns, and the subsequent activity, if any, that creates new or additional patterns.

In conducting the interpretive content analysis, this researcher read the interactions in context. Reading the posts in context provided a better understanding of what prompts interactions, responses, questions, and subsequent conversations within each setting. This analysis addresses research question one.
Correspondingly, this study used social network analysis to obtain quantitative data to address research question two, discussed in greater detail in the Data Analysis Procedure (3.9) of this paper. Analyzing each discussion post in the context in which it occurred using interpretive content analysis allowed this researcher to view each peer mentoring site holistically and naturally as it developed and evolved. Additionally, the interpretive content analysis allowed this researcher the opportunity to view the interactions of the peer mentoring sites as they develop as specified in research question one. Analyzing the discussion board posts in this way is consistent with the process by which humans evolve as they engage in events. This researcher anticipates learning what is transpiring through the participants’ interactions as they move forward in their studies and develop as teachers.

A holistic view allows for the intersection of the participant, interpersonal, and background or environmental roles that Rogoff (2003) highlighted. This offers a view of the sociocultural “transformation of participation perspective” in which personal, interpersonal, and cultural aspects of human activity are conceived of as different analytic views of ongoing, mutually constituted processes (Rogoff, 2003, p. 52). This allows one to understand the ways in which students develop in these settings and the way in which the cultural, environmental, and interpersonal factors are included in the process.

3.2 Mixed Methods Research Design

A mixed methods design utilizes two or more methods in the same study (Wiersma & Jurs and Jurs, 2005) gathering both qualitative and quantitative data (Creswell, 2003). The mixed methods research design used in this study gathers quantitative and qualitative data from the discussion board activity of the peer mentoring
sites. This researcher gathered quantitative data to conduct social network analysis of the directed relations established in the discussions of each peer mentoring site. The quantitative analysis consisted of mapping the social network formation from directed communications among the student participants in each peer mentoring site. The interpretive content analysis consisted of the review and codification of all discussion posts of the peer mentoring sites, both direct and indirect, in those contexts.

Qualitative research describes phenomena in words, rather than numbers or measures, and has at its center the goal of developing an understanding of human systems (Wiersma & Jurs, 2005). Qualitative research has origins in descriptive analysis and uses an inductive process of reasoning, which allows for a move from a specific situation to general conclusions (Wiersma & Jurs, 2005). According to Wiersma & Jurs (2005), the field-focused, natural setting of the sample in qualitative inquiry allows the researcher to conduct a study so that phenomena may be viewed holistically and not be reduced to a few factors. This emergent approach allows for an understanding of and reaction to what is really happening (Wiersma & Jurs, 2005).

According to Eisner (1998), “qualitative inquiry is marked by the way in which the world is viewed and portrayed, and by the conceptual orientation used to see and to make sense of what has been seen” (p. 230). Eisner (1998) further claims the interpretive heart of qualitative research is defined in three ways: (1) what one attends to in the setting, (2) how one secures information about what one has observed, and (3) the way in which what one has observed is integrated and made significant. The examination of a specific event, organization or system allows for the opportunity to collect detailed data regarding
the perceptions, use, attitudes, reactions, and environments in such settings (Wiersma & Jurs, 2005).

Quantitative research, on the other hand, aims to develop knowledge by obtaining statistical data using strategies of inquiry such as experiments and surveys and data collection with predetermined instruments (Creswell, 2003). According to Wiersma and Jurs (2005), quantitative research places emphasis on facts, relationships, and causes. Quantitative approaches include the testing of hypotheses and making predictions, which through deductive processes, search for regularities across individuals or situations (Calfee and Sperling, 2010).

In this study, qualitative research analysis was applied to the discussion board postings using interpretive content analysis to review the student communications in the peer mentoring sites. This identified what motivates the students to initiate contact with one another. Further, interpretive content analysis enabled this researcher to identify whether students followed topics as introduced by the instructor prompts. Quantitative research using the social network analysis was applied to the direct communications among the students. This analysis provided the cohesiveness of the network by calculating the centralization scores and density scores of the peer mentoring sites. Additionally, this analysis provided mappings of the directed relations of each site in the form of sociograms. Both of these paradigms are explained in greater detail in the data analysis section of this chapter.
3.3 Justification of Design Choice

The mixed methods approach is appropriate for this study because this study seeks to identify how students engage in a peer mentoring forum. The social network analysis provides a map of the directed communications of the participants, thereby demonstrating how the student participants connect with one another. The interpretive content analysis examines the content of the discussion board posts authored by the participants in the context of the peer mentoring sites, thereby identifying the issues and topics that motivated the students to connect with one another. Using social network analysis and interpretive content analysis, this researcher attempts to identify whether the peer mentoring site is a beneficial tool for the student participants. A mixed methods approach allowed for a comprehensive view of the student interactions on the peer mentoring sites and cross-validation of findings (Creswell, 2003). Specifically, this study used a concurrent mixed methods triangulation approach, meaning that the qualitative and quantitative aspects occurred in the same phase and time period (Creswell, 2003).

The use of qualitative and quantitative methods in a single research study defined the mixed methods research approach in this study. The selection of a mixed methods approach provided different data perspectives to inform one another in addressing the aims of this study. “Mixed methods give complementary and mutually enhancing ways of reaching richer interpretations of observed phenomena than may be possible from a quantitative or qualitative approach alone” (Calfee and Sperling, 2010, p.7). As Creswell (2003) describes, all research methods have limitations and it is important for researchers to cancel or neutralize these biases. The use of both qualitative and quantitative methods enabled this researcher to determine how the student participants connect and identify the
topics of concern to the students in completing their degree requirements and as they prepare for careers as educators.

Interpretive research considers the issues, language, and approaches as factors in the research context to empower the participants, recognize their silenced voices, honor their individual differences, and position both the researcher's and the participant's views in a historical/personal/political context (Deem, 2002). The intent of employing interpretive research in the mixed methods approach is to study the interactions of the peer mentoring participants at a micro level. This was achieved by using transcripts of the peer mentoring discussions with all identifiers removed to analyze and interpret the patterns that the participants create as part of the mentoring sites.

Social network analysis provided this researcher with the opportunity to see the connections that are made among the participants in the peer mentoring sites. The connections established in each peer mentoring site, when mapped using social network analysis software, demonstrate the direct ties that form over the duration of each site.

Social network analysts believe that the nature of idea exchange and learning between individuals can indicate the connectivity of members in a social system (Haythornwaite, 2002). According to Galaskiewicz and Wasserman (1994), social network analysis focuses on social entities in interaction with one another and how these interactions constitute a framework or structure that can be studied and analyzed in its own right. "The social network approach examines the content and the pattern of relationships", i.e. who works with whom to determine how resources flow from one actor to another (Haythornwaite, 1996, p. 324).
The interpretive content analysis and social network analysis paradigms are mutually-informing. The interpretive content analysis examined the students' interactions and the topical issues of concern to them in completing their degree requirements. The social network analysis provided the opportunity to better understand the interaction patterns when viewed from a structural perspective. Further, the social network analysis determined how the information flows among the participants, and the relationship patterns that develop. As Scheckler and Barab (2009) learned, it is important to gain valuable insight into a situated and social context where people come together and how they interact.

Analyzing and examining the connectivity, interaction, and collaboration of students in the online peer mentoring sites provided a greater understanding of how participants develop connections in an online peer mentoring setting. As the literature demonstrates, further research regarding peer mentoring in an online environment can show what these experiences provide for students by exploring student activity and analyzing their interactions. Additionally, this research interpreted what emerged from their exchanges and the patterns that formed to aid in learning what such sites and experiences provided for undergraduate students.

This mixed-methods design is optimal because it allowed for a balanced perspective in this study. More specifically, the mixed methods design assisted in obtaining different but complementary data on the same topic to best understand interactions in online peer mentoring sites (Creswell & Plano Clark, 2007). Using a design that includes both the macro and micro perspectives allowed for these two levels of analysis and ensured that the whole peer mentoring site is included in the research and
taken into account in the analysis. Multi-level analysis provided an approach to study the integration of individuals, interpersonal ties, and the networks in which they are embedded (Wellman & Frank, 2001).

3.4 Role of the Researcher in a Mixed Methods Study

The role of the researcher in this study was to synthesize the qualitative and quantitative aspects of this mixed-methods study and place the results of the research in context within the field of study. By incorporating varied traditions to inform and enrich one another within one project, mixed methods studies reflect research designs that can magnify the researcher’s ability to approach important and complex research questions (Calfee & Soperling, 2010; Creswell, 2003; Johnson & Onwuegbuzue, 2004), “amplifying the value of observation and interpretation and leading the researcher to more robust understandings” (Calfee & Sperling, 2010, p. 9).

This researcher served as a co-facilitator in all of the peer mentoring sites considered in this study, and as such, is engaging in the situation under study. Analyzing the peer mentoring discussion board posts with both interpretive content analysis and social network analyses led this researcher to put forth more robust findings through the use of two different methods to study the same sample. As Creswell (2003) indicates, using a mixed methods approach allowed the researcher to find corroboration in the results and also to cancel or neutralize any biases that may have been inherent in the interpretive content analysis and social network analysis methods. If used singly, a method may hold limitations; mixing methods overcomes those limitations (Creswell, 2003).

In qualitative research, the researcher engages in the situation under study and
makes sense of it (Eisner, 1998). The setting for qualitative research is its natural locale, where the researcher allows the activities to occur naturally without interruption, manipulation or intervention and observes, interviews, records, describes, or interprets tasks (Eisner, 1998; Wiersma & Jurs, 2005). While the researcher becomes a part of the study by interacting closely with the subjects of the study, s/he must maintain openness about what is being observed in order to avoid missing an important detail (Savenye & Robinson, 2004; Wiersma & Jurs, 2005). Conversely, the objective nature of quantitative research does not carry similar bias risks as qualitative research.

This researcher applied for permission from the Institutional Review Board at Drexel University to conduct this study. Drexel’s Institutional Review Board granted this researcher permission to complete this study on June 11, 2008 as Exempt Category 2 with Project Number, 1042503. This researcher received the permission in letter form, which is numbered, 45 CFR 46, 101(b)(1).

3.5 Clarification of Researcher’s Bias

Successful qualitative research depends greatly on the interpersonal skills of the researcher and, according to Marshall and Rossman (1999), includes the ability to build trust, maintain good relations, respect norms of reciprocity, sensitively consider ethical issues, and maintain an awareness of the politics of the organization (Marshall & Rossman, 1999). The experiences of this researcher in online higher education have given an understanding of the setting, people, routines, and environment enabling the researcher to anticipate how to assume this role.

Qualitative inquiry requires researchers to represent the participants in their work and at the same time carefully scrutinize the interplay of their own personal biography
with that of their participants (Marshall & Rossman, 1999). This researcher's previous experience and coursework have provided experience in observation and active, patient, and thoughtful listening and analysis skills as recommended in the literature (Marshall & Rossman, 1999, p. 85). Reflection on my background and style in inquiry was necessary to determine how my personal biography shaped the study (Marshall & Rossman, 1999). I reflected continually throughout the data collection and analysis procedures by maintaining notes to record observations with ongoing reflection, analysis, and recording of thematic insights.

Clarifying this researcher's role as a co-facilitator of the mentoring sites explained any bias this may have brought to this study (Creswell, 2003). This researcher's role as a co-facilitator of the peer mentoring sites allowed her the chance to become acquainted with the participants directly. As a co-facilitator of the mentoring sites, this researcher's role was to ensure that the students communicated with one another in positive and respectful ways. Through this researcher's participation in each site as a co-facilitator, this researcher was able to experience events in the way that the people she was researching experience them (Erickson, 1985). Additionally, this enabled the researcher the opportunity to discover the "nature of social reality by understanding the actor's perception/understanding/interpretation of the social world" (Erickson, 1985). While my experiences as an online instructor have afforded me an understanding of an institution of higher education's norms, values, rituals, and governances, I do not consider this understanding a liability. Rather, it is more properly interpreted, as Eisner (1998) has pointed out, as a "way of providing individual insight into a situation, not a license for freedom" (p. 35).
3.6 Site Selection and Sampling Plan

3.6.1 Site Selection

To pursue this research, a peer mentoring site was selected in an online undergraduate program to provide a purposeful and relevant sampling. This research was conducted at a private university located in the northeastern area of the United States of America founded in the late nineteenth century as a school for men and women to pursue educational opportunities in the arts and sciences without prejudice to background. This university began offering online education programs in 1996. Currently, undergraduate and graduate degree programs are offered at this university using fully online or hybrid models. The study of an online program at this institution with a mixed method approach aims to provide “information rich” instances (Wiersma & Jurs, 2005, p. 285) of student activity on mentoring sites in an online teacher education program. This study includes two different levels of student progression toward the completion of their degree program, specifically first- and third-year students. This provides both the novice and more experienced or expert perspectives in this sampling.

The university where this research occurred has received accreditation from the Middle States Commission on Higher Education (MSCHE) under the Council for Higher Education Accreditation (CHEA), which “is the primary means of assuring and improving the quality of higher education institutions and programs in the United States. The baccalaureate program under study also received approval from the Pennsylvania Department of Education to prepare teachers through their teacher education program.

The peer mentoring sites within the undergraduate teacher education programs considered in this study join students completing two courses, the freshmen pedagogy
seminar and the junior pedagogy seminar. Both of these courses are required for completing the baccalaureate degree in Teacher Education at the selected university. The peer mentoring site meets the criteria for inclusion in the study in that the enrolled students are in their first-year of study enrolled in the freshmen pedagogy course and also in an upper level of the program completing the junior pedagogy course.

The discussions of each mentoring site were scheduled in increments of seven over the course of ten weeks with topics changing for each increment in a Blackboard™ online learning platform. Each discussion began on a Tuesday and continued through the week, concluding on the following Monday evening. The participants in each peer mentoring site were free to re-visit and re-post to previous threads even if a subsequent week’s discussion had already commenced. The discussions typically began with questions posed by the facilitator as shown in Table 1. Each student is requested to post two to three times during the weekly discussions. The moderating facilitators make no further attempt to define the student participation on the discussion board. Mentoring participation totals fifteen (15) points out of one hundred (100) for each seminar, respectively. If the students posted the minimum number of times as requested by the facilitators, they were deemed to have earned the fifteen (15) points for participation. Points are awarded to the students for participation in the discussion board, not awarded based on frequency of postings.
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Prompt for each Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week One</td>
<td>Mentoring Site Introductions: Please introduce yourself to your fellow classmates. This is a great opportunity for you to mingle with students outside of your cohort to gain insight into their experiences with the program as well as to provide them with information that you have gained as you complete the program.</td>
</tr>
<tr>
<td>Week Two</td>
<td>The intent of this mentoring Discussion Board is to provide a &quot;meeting place&quot; for Drexel Online Education students. So now that you have introduced yourselves, I would like 105B students to post some questions that you would like the 305's to answer. Remember that the 305's have completed their pre-student teaching requirements and have taken the Praxis.</td>
</tr>
<tr>
<td>Week Three</td>
<td>Thank you to the 305's for providing insights into the pre-student teaching experience and the Praxis I. This week would you please share your ideas on incorporating differentiation into lesson plans. How can you accommodate the different learning needs/styles of students when you are in the classroom? What have you observed that works? Doesn't work?</td>
</tr>
<tr>
<td>Week Four</td>
<td>What effective classroom management techniques have you either observed or used in your classroom?</td>
</tr>
<tr>
<td>Week Six</td>
<td>What advice do you have for handling difficult parents? For a new teacher, the parent/teacher relationship is uncharted territory and it can be intimidating. What do you say to the parent who never comes to conferences, the one who thinks you are &quot;picking&quot; on his/her child, the one who thinks that his/her child should be getting all &quot;A's&quot;, etc.</td>
</tr>
<tr>
<td>Week Eight</td>
<td>What &quot;words of wisdom&quot; would you like to give to the 105's about pre-student teaching? What was your biggest challenge?</td>
</tr>
<tr>
<td>Week Ten</td>
<td>The end of the quarter is coming quickly. This week, the students in 305 will be thinking about how to come into their own as teachers and sharing some of their wisdom with you. I hope you will find them inspiring.</td>
</tr>
</tbody>
</table>
3.6.2 Sampling Plan

A purposeful sampling of students enrolled in the mentoring sites joining freshmen and junior pedagogy seminar courses during the Fall and Winter terms of the 2008-09, 2009-10, and 2010-11 academic years were used as the samples for this study. All of the mentoring sites join first-year and third-year students. The Fall 2008-09 mentoring site will be known as Mentoring Site 1 (MS1). The Winter Term 2008-09 mentoring site will be known as Mentoring Site 2 (MS2). The Fall 2009-10 mentoring site will be known as Mentoring Site 3 (MS3). The Winter Term 2009-10 mentoring site will be known as Mentoring Site 4 (MS4). The Fall 2010-11 mentoring site will be known as Mentoring Site 5 (MS5). The Winter Term 2010-11 mentoring site will be known as Mentoring Site 6 (MS6). This provides the opportunity to view interactions over the course of several terms with different students to study recurring patterns.

The participants of this study were drawn from the Bachelor of Science Online Education Degree Completion Program student population. The students were notified about the study via an email message. The email message included a description of the study. In order to participate, the students were asked to respond to the email message with their willingness to participate in this study.

3.7 Data Collection Procedures

According to Krueger & Casey (2000), collected data needs to be recorded in a systematic manner that will facilitate analysis. The main ways of capturing collected data are through transcripts, digital recordings, notes, and memory (Creswell, 2003). Data obtained through qualitative methods are filled with good description, relevant dialogue, pieces of evidence, and clues that when put together make analytical sense out of what is
being studied (Bogdan & Biklen, 2003). On the other hand, information that is collected using quantitative methods yields statistical data (Creswell, 2003). In completing the qualitative and quantitative aspects of this study, analysis of de-identified, unabridged transcripts of the discussion board interaction from the peer mentoring sites were used. The online situation provided an opportunity not otherwise available to study discussion board interaction in the peer mentoring situation, in that the transcripts from these interactions are available in complete and unabridged form. The researcher can then analyze accurate and thorough records of interaction.

The collection of data consisted of obtaining the text from threaded discussion boards of the six peer mentoring sites in Blackboard™. These are MS1, MS2, MS3, MS4, MS5, and MS6. The researcher printed all of the discussion posts and dated each one to record the day each was obtained. In order to ensure the anonymity and objectivity of the data obtained from the online discussions, an honest broker de-identified the postings. This broker, an individual independent of the project, blacked out all identifiers related to the student and his or her identity in each posting. Numerical identifiers and color codes were assigned to each individual for representation throughout each peer mentoring site. The color codes, pink for third-year students and orange for first-year students, provided this researcher a way of determining patterns that emerged between students of the same level and across levels. A supplemental color code of green was assigned to students who participated in more than one peer mentoring site. This information was helpful in examining activity of students who participated in more than one peer mentoring site. Then, the broker provided this researcher with the de-identified discussion material, which was then analyzed qualitatively using interpretive content analysis and quantitatively using social network analysis.
The interpretive content analysis consisted of reviewing and codifying the collected data using an emergent coding system. The social network analysis began with the creation of matrices for MS1, MS2, MS3, MS4, MS5, and MS6 to document the directed interactions of each participant. These methods are further discussed in the Data Analysis Procedures (3.9).

3.8 Data Analysis Timeline

September - October 2011 - Review and Codify Discussion Board Postings

December 2011 – March 2012 – Conduct Social Network Analysis

December 2011 – May 2012 – Review the Interpretive Content and Social Network Analyses

3.9 Data Analysis Procedures

The purpose of this study is to analyze interactions among participants in peer mentoring sites specifically crafted to support and enable communication among first- and third-year students in an online undergraduate teacher education program. This analysis provides insight into the benefits of the participants’ experiences in this setting and will add to the research into specially crafted practice fields (Barab & Duffy, 2000).

In order to view the peer mentoring setting holistically, this study used interpretive content analysis and social network analysis to analyze each peer mentoring discussion post. Each post served as a unit of analysis. The unit of analysis is situated in the discussion board context of the peer mentoring sites and was studied in the context in which it occurred. This allowed the researcher to opportunity to observe how the discussions developed in this setting and the ways in which the participants engaged with and learned from each other.
The qualitative research in this study was informed by interpretive content analysis. The interpretive content analysis provided a detailed view of the interactions between peer mentoring site participants, specifically: (1) how they begin, (2) what forms they take, (3) the instances of practice development in teaching, and (4) what the participants say to one another. The interactions were categorized via keyword or context through a coding process. The quantitative research in this study was informed by social network analysis. The social network analysis showed how these interactions can be viewed from a macro-perspective, graphically illustrating the network structure and communication patterns to aid in determining the cohesiveness of the network (Haythornwaite, 2002).

3.9.1 Interpretive Content Analysis

Individuals learn actively through engaging and interacting with fellow learners. Henri (1992) believes that computer-mediated communication provides a plethora of information regarding the psycho-social dynamics among students in online learning environments. In order to better understand these dynamics, we should discover the social organization of communication, comprised of the patterns, the function, and social meanings of communication forms (Bauman, 2007). Analysis of such interactions in computer supported collaborative learning settings can “reveal information that is not situated at the surface of the transcripts” and provides convincing evidence about the learning and the knowledge construction that is taking place and in-depth understanding of the online discussion (De Wever et al., 2006, p. 7).

Qualitative analysis of the participant contributions of the online discussions help to identify the topics that encourage students to initiate and possibly maintain contact
with one another. In analyzing language, researchers can look beyond the individual sentence to the larger setting and context, enabling a larger view (Monaghan, 2007). This allows a researcher to situate a portion of a particular communication into the broader context from which it emerged (Monaghan, 2007). One can view sentences in their larger context. Viewing sentences in their context will enable a researcher to focus on the social matters of the situation and what the participants are accomplishing (Monaghan, 2007). When looking at a sentence in a larger context, one’s interpretation can change dramatically, according to Monaghan (2007). Seeing the way a particular sentence or contribution has emerged in a particular schema can add meaning to a sentence that would otherwise not be evident (Monaghan, 2007).

Content analysis can identify how students and instructors participate in discussions, raise topics, ask questions, and interact with one another (Calfee & Sperling, 2010). Transcripts of such interactions provide particularly rich sources of information (Monaghan, 2007). Vygotsky’s theories of learning through interaction provide the basis to study discourse for patterns of collaboration (Calfee & Sperling, 2010). Analysis of discourse often focuses on what causes people to make a turn in conversation and how certain aspects of interaction invite traditional answers. A researcher can locate meanings at every level of communication, but in discussions particularly, one can find the mediating force between many levels of meaning (Monaghan, 2007).

The interpretive content analysis facet of this research consisted of a series of steps. First, the collected discussion board data from each mentoring site were organized (Creswell, 2003). Then, as Creswell (2003) recommends in his qualitative analysis model, the transcripts of each discussion were read and reread for patterns of key issues,
recurrant events, or activities. The detailed analysis of the data continued with a coding process. "Coding is the process of organizing the material into chunks before bringing meaning to those chunks" (Creswell, 2003, p. 192). This stage of the process consisted of taking the raw discussion board data and creating categories based on emerging patterns in the data. These categories were be given descriptor phrases or codes (Creswell, 2003). These codes were not be pre-assigned, rather they emerged from the data collected. This researcher then reviewed each posting (often several times) to look for patterns that may exist in the data.

Codifying the data in the discussion boards depended upon the clarity of each participants’ post. To understand the content of each discussion post, the researcher had to consider such factors as the words used by the student, the sentence construction, the context of the entire posting, the context in the discussion, and if the posting was a response to a previous post or posts (Monaghan, 2007). This analysis required time, thought, consideration, and contextual attention in order to clearly document the students’ intentions (Monaghan, 2007). Moreover, this analysis showed meaning in and interpretation of the discussions (Monaghan, 2007).

Following the identification of the categories, the data were examined again to collect and regroup all incidents of reference to the identified categories along with the supporting participant quotes. The emergent categories were grouped and regrouped with supporting quotes to generate the themes that formed for the basis of the major findings for analysis. The data were represented using detailed descriptions of the emergent themes from the selected peer mentoring sites to summarize the findings (Creswell, 2003).
Lastly, the discussion board data were interpreted to include specific implications that correlate with the study's research questions (Creswell, 2003).

3.9.2 Social network analysis

Social network analysis is based on the premise that social life is created primarily by relations and the patterns formed by these relations (Marin & Wellman, 2010). A computer-supported social network is a network that links people, institutions, and knowledge using computer-supported communication (Wellman, 2001). A social network is a set of people connected by a set of socially meaningful relationships (Wellman, 1997). Social network analysis can be helpful in understanding how people relate to each other through computer-mediated communication (Wellman, 1997; Wellman & Gulia, 1999; Wellman et al., 1996). Considering relationships in terms of social networks rather than groups allows analysts to examine the social contexts of online relations and the potential of computer-mediated communication to support interactions that may be sparsely knit and less bound (Fulk et al., 1987; 1985; Koku & Wellman, 2002; Rice, Grant, Schmitz, & Torobin, 1990; Wellman & Gulia, 1999; Wellman et al., 1996).

Social network analysis provides avenues to detect structural patterns regarding the ways that different types of relationships relate using procedures to reveal structural patterns, analyzing the implications for the structural patterns of the behavior of network members, and studying the impact on social structures of the characteristics of network members and their social relationships (Wellman, 1997). With online learning and networks still developing and taking shape, Renninger and Shumar (2002) have found methods for categorizing interaction and groupings in face-to-face environments do not
fully describe the nuances of online interactions and connectivity. Social network analysis provides a way to describe the nuances of online interactions and connectivity as it considers social structure to be the patterned organization of network members and their relationships (Wellman, 1997). According to Wellman (1997), social network analysts work to explain the impact of, and to account for, changes in social structure.

In social network analysis, relationships describe a specific kind of interaction between individuals (Haythornwaite, 1996). Relationships combine to form ties and patterns of ties to reveal social networks and subnetworks (Haythornwaite, 1996). Information regarding the ties that students are maintaining will show the patterns of interaction, specifically who turns to whom for support, how frequently, and how information travels among the participants. This perspective can aid in explaining how interpersonal exchanges can act as building blocks in distributed online learning (Haythornwaite, 2002).

When using the social network approach to study the properties of networks as a whole, Haythornwaite (2002) describes the importance of determining the cohesiveness of a network, which is “the extent to which class members are interconnected” (p. 180). To look at the cohesiveness of a network, Haythornwaite (2002) advises to first examine the centralization of the network, which is “the extent to which it is organized around a single central individual” (p. 180). The second step would be to examine the density of the network (Haythornwaite, 2002). This will show the degree to which all members of the network are interconnected.

For this data step, the whole network of each peer mentoring site considered in this study was used. Whole networks, according to Marin and Wellman (2010), view the
social structure of the selected sample or setting aerially to focus on all participants or nodes. Whole networks often focus on one or a small number of networks (Marin and Wellman, 2010). The whole network study begins with a list of included nodes and includes data on the presence or absence of relations between every possible pair of nodes (Marin and Wellman, 2010). This researcher then determined the relations between the nodes or identified network members (Marin and Wellman, 2010). Full network analysis gave a complete picture of the relations of each of the peer mentoring sites. Relations of the peer mentoring setting are measured as directed ties, which go from one node to another, and binary, which either exist or do not exist within each dyad (Marin and Wellman, 2010).

This researcher focused on the collected data as a single type of node network, i.e. where every node could conceivably be connected to any other node (Marin and Wellman, 2010). The de-identified discussion board data consisting of communications initiated by site participants specifically directed at other named site participants were included in this analysis to calculate measures of the properties of network positions and the networks as a whole. Discussion posts addressed generically to all site participants as a whole, i.e. “blasts”, were not considered for the purpose of social network analysis. These posts were read in context for the interpretive content analysis.

Density, according to Haythornwaite (2002), is the number of connections that exist proportional to the total number of possible connections in a network. Dense networks have connections among all or almost all of its members so that resources can flow readily from one part of the network to another (Haythornwaite, 2002). In networks that are not as dense, Haythornwaite (2002) describes that resources or information may
have to flow from the outer periphery of a network to central figures in order to reach other outlying areas of the network or the lack thereof. This slows the transfer of information in this network. A discussion of the calculation of these factors is provided later in this subsection. According to Haythornwaite (2002), the denser a network, the more likely every member will have access to the same information within the same time period. Pictures of whole networks can show whether information is circulating among all members or whether subsets of participants are communicating with one another in small groups of learners in computer-supported learning (Haythornwaite, 2002). Density provided a way to compare interactions across networks to see connections among participants (Haythornwaite, 2002). It is anticipated that measuring the density could aid in determining the levels and types of collaboration across the mentoring sites. This must be done with thought to the overall size of the networks so that comparisons are accurate (Haythornwaite, 2002).

In communities of shared interest, networks provide contexts for similar people to act similarly and to observe each other acting similarly (Wellman & Frank, 2001). The pervasiveness of such ties and the ability of such ties to connect distinct social circles provide abundant network capital (Laumann, 1973; Granovetter, 1982; Ferrand, Mounier, & Degenne, 1999; Wellman & Frank, 2001). According to Kumpulainen and Mutanen (2000), investigating and interpreting the dynamics of social activity and learning is extremely complex. Haythornwaite (2002) asserts that through exchanges, participants can share information among a group and build a repertoire of knowledge within the network (Haythornwaite, 2002). This relates to the concept of “legitimate peripheral participation”, where theoretically generative interconnections with persons, activities,
knowledge, and the world provide a means to determine how the theory of social practice (which includes learning) aids in the thought development and the newcomer advancement in the community of practice (Lave and Wenger, 1991). Using social network analysis aided this researcher in determining how newcomers and more experienced students interact in the peer mentoring setting and the ties that they form by determining their interaction patterns.

The network-level of social analysis allows researchers to look at the composition of networks, e.g. size, homogeneity, and mean frequency of contact, to understand how the properties of the network affect what happens in them (Wellman & Frank, 2001). According to Wellman & Frank (2001), it is the nature of the network that facilitates the benefit of potentially supportive ties. Studying networks in-depth provides information about their characteristics, allowing researchers to study these for patterns. Social network analysis incorporates a set of structural variables such as the density, clustering, heterogeneity, and multiplexity of networks (Wellman, 1999; Berkowitz, 1982; Scott, 1991; Wasserman & Faust, 1994; Wellman & Berkowitz, 1998; Ahuja & Carley, 1999; Tindall & Wellman, 2001) to see how different types of relationships interrelate, to detect structural patterns, and to analyze the implications these variables have on the network members (Koku & Wellman, 2002).

In this study, the online, peer mentoring sites connect students using computer-mediated communication via Blackboard™, a computer-supported learning management system. This study used social network analysis to analyze and describe the interactions of the peer mentoring site participants to understand how the participants create social structures through their connections and activity with other members. The social network
analysis of the collected data for this study examined the directed relations among the peer mentoring participants. This allowed the researcher to consider how variations in network composition may affect the ways in which social support is given by examining the level of ties, which show the providers and receivers of support within the network (Wellman & Frank, 2001). According to Wellman & Frank (2001), the tie may be the most determinant factor of network capital. With the network dominated by the tie, the participant persona becomes an active player of the network center (Wellman & Frank, 2001).

The discussion board interactions presented data that had to be read to prepare it for the creation of a matrix and SNA analysis. An independent broker de-identified each discussion board post and represented each identifier with a number to signify the author. Once the de-identification process was complete, each post was read in context to determine if the message was directed to a single person in the setting or to the entire group.

Social network analysis displays the relations between actors in a sociogram that have been documented in matrix form. Social network data are recorded in forms of an adjacency matrix, where each node has a column and a row in the matrix (Hanneman & Riddle, 2005). When a connection exists between two actors, a 1 is placed in the cell where the two actors intersect. If a connection does not exist, a 0 would be placed in that cell. Because this matrix has the same amount of rows and columns, Hanneman & Riddle (2005) describe this type of matrix as square.

This researcher created a matrix for the directed relations of MS1, MS2, MS3, MS4, MS5, and MS6, showing who directs a communication to whom and also who
receives a connection from whom. First, each discussion board post was read. For each post that has a direct recipient, this researcher recorded the numerical identifier for the post’s author and the recipient of the post. Then, this data was placed into a matrix. The matrix noted all actors in the setting in the column and row headers. If a tie existed between two actors, a ‘1’ will stand in the space of their interaction. The box intersection is indicated with the row heading, which indicates the director of the communication, and the column heading the recipient. As Scott (1991) describes, the usual convention to present directional data in a matrix has data running from a row element to a column element. Table 2 shows actor A has a relational tie with actor C. Actor B has a relational tie with actors A and C. Actor C has relational ties with actors B and D. Actor D has relational ties with actors A and C. Since each actor represented in Table 2 cannot establish ties with themselves, the letter x is placed in the box where this relationship would be represented.
Table 2

Example of a matrix depicting directed relations between actors in a setting

<table>
<thead>
<tr>
<th>Actors initiating a relation</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>X</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>1</td>
<td>X</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>X</td>
</tr>
</tbody>
</table>

The sociograms depict each actor as a point and the relations will be shown as lines (Scott, 1991). Arrows point to the actor to which they are directed. The sociograms show the pattern of connections among the points, which represent the actors in the setting. If the message is directed to the entire group, the post is not be represented in the matrix. This matrix only represents directed ties. Additionally, this matrix is slightly complex to construct in that the discussion posts are read in the context in which they were created and housed. On some occasions, students may have replied to a previous post and have spoken directly to the writer of the previous post, but may not have directly named this student in the message. The reader has carefully read the posts to determine the direction. Reading these posts in the context in which they occurred allowed this researcher the opportunity to know how they developed and to what each may be responding.
Collecting data from online discussion board interaction does not allow the researcher the chance to ask follow-up questions as occurs in interview settings. The interactions determine the relations. To provide additional information regarding the participants of each peer mentoring site, this researcher used attribute data of level in the program, participation in more than one peer mentoring setting, geographic location, gender, ethnicity, and age. This attribute data allowed this researcher to see the ways in which these attributes can inform the patterns that form in the data analysis. The attribute data is demonstrated aggregatedly in the sociogram form for each peer mentoring site.

Following Haythornwaite’s model (2002), this study used social network analysis to examine the cohesiveness of each peer mentoring site as a network by determining the centralization and density of MS1, MS2, MS3, MS4, MS5, and MS6. Centralization in a network indicates “the extent to which certain network members are prominent in a given network in terms of connectivity among network members” (Koku & Wellman, 2002, p. 7). Centralization scores, calculated as a percentage, measure how variable or diverse the individual network member might be (Koku & Wellman, 2002). A high centralization score, according to Koku & Wellman (2002), means that a network’s activity centers around one particular member. This researcher studied the connections that emerge over a three-year period in the peer mentoring setting to determine the connections that emerge. This included calculating centralization and density scores UCINet software (Borgatti, Everett, & Freeman, 2002) to determine the central figures in this setting. A high percentage showed that the network activity centers around one member.

The density of a social network is the extent to which its members are in direct contact with each other (Koku & Wellman, 2002). Koku and Wellman (2002) further
describe densely-bound networks as having frequent contact among members. Network density, according to Koku & Wellman (2002), gives an understanding of the extent of direct connectivity among network members and how this affects communication patterns and access to resources. In order to determine the network density of the peer mentoring setting, i.e. the extent to which its members are in direct contact, this researcher will use UCINet software (Borgatti, Everett, & Frenman, 2002) to calculate the total number of communications for each member proportional to the total number possible for each member. The formula for density for directed data is \( \frac{1}{\ln(n-1)} \) (Scott, 1991).

Table 3

*Social Network Calculation Definitions*

<table>
<thead>
<tr>
<th>Terms</th>
<th>Definition</th>
<th>Type of Calculation</th>
<th>Applicable to Individual or Site as a whole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>the extent to which the members of a particular group are in direct contact with each other</td>
<td>Percentage</td>
<td>Applied to each peer mentoring site</td>
</tr>
<tr>
<td>Centralization</td>
<td>Measures the degree of inequality</td>
<td>Percentage</td>
<td>Applied to each peer mentoring site</td>
</tr>
<tr>
<td>In-degree Centrality</td>
<td>measures the number of ties an actor receives in a given network</td>
<td>Percentage</td>
<td>Applied to each individual in each peer mentoring site</td>
</tr>
<tr>
<td>Out-degree Centrality</td>
<td>measures the number of ties that each actor directs in the network.</td>
<td>Percentage</td>
<td>Applied to each individual in each peer mentoring site</td>
</tr>
</tbody>
</table>
This researcher determined the degree centrality scores for each actor in the peer mentoring sites for the Fall and Winter terms of the 2008-9, 2009-10, and 2010-11 academic years using UCINET software (Borgatti, Everett, & Freeman, 2002). The degree centrality scores measure the ties that each actor receives and directs in the network. The in-degree centrality calculation measures the ties an actor receives. The out-degree centrality calculation measures the ties an actor directs. According to Hanneman & Riddle (2005), if an actor receives many ties, they are considered prominent or have a high level of prestige. An actor who receives communications from many other students will have a high in-degree score. If an actor directs information to many others or makes others aware of their views, this actor would have a high out-degree score (Hanneman & Riddle, 2005). These actors, according to (Hanneman & Riddle, 2005) are said to be influential.

3.10 Reliability and Validity

Reliability, according to Wiersma & Jurs (2005), refers to the consistency of the research and the extent to which studies can be replicated. Validity consists of two facets, internal and external validity (Wiersma & Jurs, 2005). Internal validity relates to the reflection of the findings on what is really there in the data (Schrire, 2006). This concept considers the conditions of the study that make the results interpretable (Wiersma & Jurs, 2005). External validity refers to the extent to which results are generalizable to populations or conditions (Wiersma & Jurs, 2005).

Mixed methods critics advocate for the use of validity procedures for both qualitative and quantitative aspects in this type of study (Creswell, 2003). Calfee and Sperling (2010) have found a positive correlation when researchers use the qualitative
facet of determining what goes on in a context with the quantitative aspect of determining correlations - both simple and complex - among relations, as this mixed methods study will do. This study used strategies that refer to the trustworthiness, authenticity, and credibility of the research as Creswell (2003) suggests.

Wasserman and Faust (1994) have advanced concerns in social network measurement regarding the validity, reliability, and measurement error. Wellman & Frank (2001) have determined that if network analysis occurs without consideration of the context in which it occurs, the results could produce biased standard errors, underestimation of standard errors, and possibly false conclusions. This research examined the discussion contributions in the context where they occur, which aided in this researcher’s effort to put forth trustworthy, sound, authentic, and accurate findings and help to prevent the underestimation and potential of bias of standard errors. Studying the discussion posts in context ensured that the results of this study are taking into account any effects the environment may have on the activities of the discussion forum. This also strengthens the accuracy of the findings from the standpoint of the researcher, the participant, or the readers of the account (Creswell & Miller, 2000).

According to Carrington, Scott, and Wasserman (2005), to strengthen validity and reliability in social network analysis, it is important to scrutinize the quality of data, especially the archived data. To address this concern, the data for this study was inspected to ensure its accuracy and completeness. This served to strengthen the reliability of the findings. Considering several peer mentoring sites within this study is also expected to increase reliability. Analyzing the interactions of students over a three-year period with the enrollment of new students as each new quarter begins allowed this
researcher the opportunity to determine if these patterns are recurring or whether they stand alone among the participants.

A researcher must not only collect evidence, but also establish the meaningfulness and stability of the evidence (Calfee & Sperling, 2010). One of the most important strategies that one can use to ensure internal validity is the use of triangulation throughout the study, which includes using multiple theoretical perspectives, multiple sources of data, and multiple methods to confirm the findings (Schriger, 2002; Stake, 1995). The following section outlines the way that this study will include triangulation.

According to Yin (2004), any finding or conclusion in a study is likely to be more convincing and accurate if it is based on several different sources of information. This study will use data from the six peer mentoring sites as multiple data sources. Using the social network paradigm and interpretive content analysis will include multiple data collection and analysis procedures in this study. Multiple data sources and multiple data collection procedures will serve to corroborate the same phenomena and to examine evidence from the different data sources builds a “coherent justification for themes” (Creswell, 2003, p. 196). According to Maxwell (1996), the triangulation process of collecting information from a diverse range of individuals using a variety of methods reduces the risk that conclusions will reflect systematic biases and allows for a better assessment of the validity of the study.

This researcher will conduct the interpretive content analysis and social network analysis in the same time and place, which is known as concurrent triangulation (Creswell (2003). This is advantageous, according to Creswell (2003), because concurrent triangulation can result in well-validated and substantiated findings. Having a
pattern appear in the results of more than one data form can build confidence in the researcher that the pattern is synchronous with its intended scope (Monaghan, 2007).

Researchers have increased reliability and validity measures in social network analysis. A validity concern, according to Wasserman and Faust (1994), regarding centrality in social network analysis pertains to the research measuring the importance and prominence of the sample under study authentically and fully. Certainty in a researcher’s definition of the terms associated with the social network analysis will strengthen the validity of this study by ensuring that the data is meeting the stipulated terms of this analysis. In social network analysis, reliability is much higher for aggregate measure, e.g. size and density, than for information on individual subjects or relationships. The small size of this study will increase its reliability in that more than one peer mentoring site will be examined and each site examines relations among many participants.

Measures that were taken to contribute to the validity and reliability of this study include the use of rich and thick descriptions to convey the interpretive content analysis findings and clarify my personal bias. According to Creswell (2003), this will allow the readers to gain an in-depth knowledge of the participants’ experiences intending to give the study an element of shared experiences. This researcher will strive to ensure that this study is conducted with the utmost integrity and respect for this process and the presentation of accurate and reliable findings.
Figure 1. Multiple data sources will emerge from multiple discussions of the six peer mentoring sites. The application of social network and interpretive content analyses will yield two varying perspectives to analyze the activities of the mentoring sites. The use of these methods will serve to triangulate the data and will enhance internal validity. Construct validity and triangulation will be broadened by the use of six peer mentoring sites and two sources of evidence.

In addition, the transcription of the data will serve to aid in the avoidance of any threats to valid descriptions such as the inaccuracy or incompleteness of the data (Maxwell, 1996).

3.11 Ethical Considerations

Qualitative research in education often focuses on the "human participant from whom or about whom the data are collected" (Wiersma & Jurs, 2005, p. 418), which incurs ethical and legal considerations. Working with human subjects and their interactions demands a responsibility to respect the "rights, needs, values, and desires of the informants" (Creswell, 2003, p. 201). To minimize risk to subjects, this research
includes the assurance of confidentiality of information and informants. Eisner (1998) highlights the concept of informed consent as vital in maintaining and upholding the rights of individual subjects in qualitative research.

In this study, students and instructors will receive written descriptions of the study that will include the following elements as described by Creswell (2003): the right to participate voluntarily, the right to withdraw at any time, a clear articulation of the purpose of the study in order to assure that individuals understand the nature of the study and its impact, a description of the procedures of the study so that the participants can anticipate their involvement, and a reference to their right to ask questions and have their privacy respected (Creswell, 2003).

Throughout this study, confidentiality and protection of participants is paramount. “We promise confidentiality to those whom we study” (Eisner, 1998, p. 218). To ensure the anonymity of the study participants, the removal of all personal identifiers in the threaded discussions will serve to support this goal. The identification of individual participants will be private and data included in this study will not reference any personal identifiers.

3.12 Summary

This chapter explains and justifies the methods within the framework of the mixed methods research design that this researcher will use to allow readers to see how online undergraduate students interact in six peer mentoring sites, each of which bridges two seminar courses that are part of their program of study. This chapter presents the selection procedures, a description of these procedures, and the rationale for inclusion in the study. The overview of the methodology establishes the data collection methods and
analyses that will be used to address the research questions of this study. Presentation of the data analysis in a richly detailed narrative follows in Chapter Four.
CHAPTER FOUR: RESULTS AND ANALYSIS

The purpose of this study is to determine how the online peer mentoring sites functioned for students. Specifically, this study examined the communication patterns that occurred among the students by mapping the social networks that formed. This study also examined the content of the participants’ discussion board posts to provide information on what started, engaged, and maintained online discussions among the students. The data was collected from the online peer mentoring sites and was analyzed using social network analysis and interpretive content analysis.

This chapter presents a summary of the results of the data collection and analysis. First, the results of the social network analysis are presented. Then, this researcher discusses the interpretive content analysis as applied to the six peer mentoring sites, which includes categorizing the codes that emerged from the interpretive content analysis into themes. Next, the codes that emerged from the interpretive content analysis process are categorized into themes. This researcher then presents the themes identified as emerging from the codes. Lastly, this researcher presents the data as it pertains to the research questions.

The total number of discussion posts for the Fall and Winter peer mentoring sites for the 2008-9, 2009-10, and 2010-11 academic years was 1601 (N=1601). Table 4 provides the total number of messages for each week of each peer mentoring site. Table 5 shows the breakdown of first- and third-year students, the number of facilitators, and the total number of participants in each site.
Using a mixed-method research design strengthens this researcher’s conclusions by providing two perspectives to analyze the discussion board data. The social network analysis as applied to each academic term in this study provides a visual representation of the directed discussion posts based on the matrix data. The visual representations allow this researcher to view the ties or relationships that develop from directed interactions and the roles that emerge among the participants. The interpretive content approach provides analysis of the content with which this researcher could understand what drove discussions, how they evolved, and what the discussions entailed.

4.1 Social Network Analysis

The de-identified discussion board interactions presented data that was reviewed to prepare it for the creation of a matrix and social network analysis. Each discussion board post was read to determine if the message was directed to a single person in the setting or to the entire group. Messages directed generally to the entire group of student participants are not included in the directed interactions analyzed using the social network analysis. These messages do not directly communicate with particular participants, therefore they do not factor into the analysis of directed relations formation. The interpretive content analysis, however, includes all posts from the peer mentoring sites selected for this study.

This researcher created matrices of the interactions of the discussion board activity for each peer mentoring site selected for inclusion in this study. Specifically, two matrices were created for the Fall 2008-9 (MS1), Winter 2008-9 (MS2), Fall 2009-10 (MS3), Winter 2009-10 (MS4), Fall 2010-11 (MS5), and Winter 2010-11 (MS6) peer mentoring sites. These matrices included different attributes. One (1) matrix
demonstrates level in the program and participation in more than one peer mentoring site.

The other matrix indicates gender, age, ethnicity, and geographic location in aggregate

**Table 4**

*Discussion Board Post Totals for MS1 - MS6*

<table>
<thead>
<tr>
<th></th>
<th>MS1 Fall 2008-9</th>
<th>MS2 Winter 2008-9</th>
<th>MS3 Fall 2009-10</th>
<th>MS4 Winter 2009-10</th>
<th>MS5 Fall 2010-11</th>
<th>MS6 Winter 2010-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week One</td>
<td>169</td>
<td>96</td>
<td>19</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Week Two</td>
<td>68</td>
<td>158</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Week Three</td>
<td>97</td>
<td>108</td>
<td>21</td>
<td>7</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Week Four</td>
<td>0</td>
<td>142</td>
<td>15</td>
<td>4</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Week Five</td>
<td>51</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Week Six</td>
<td>44</td>
<td>100</td>
<td>21</td>
<td>6</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Week Seven</td>
<td>42</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Week Eight</td>
<td>77</td>
<td>92</td>
<td>21</td>
<td>6</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Week Nine</td>
<td>69</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Week Ten</td>
<td>24</td>
<td>39</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>641</strong></td>
<td><strong>735</strong></td>
<td><strong>119</strong></td>
<td><strong>41</strong></td>
<td><strong>9</strong></td>
<td><strong>56</strong></td>
</tr>
</tbody>
</table>
Table 5

Participants in MS1 - MS6

<table>
<thead>
<tr>
<th>Mentoring Site</th>
<th>First-Year Students</th>
<th>Third-Year Students</th>
<th>Facilitators</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1</td>
<td>20</td>
<td>17</td>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>MS2</td>
<td>34</td>
<td>12</td>
<td>3</td>
<td>49</td>
</tr>
<tr>
<td>MS3</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>MS4</td>
<td>19</td>
<td>5</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>MS5</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>MS6</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

form of the participants of the peer mentoring site. Using NetDraw, this researcher was able to provide two (2) visualizations of each peer mentoring site with attribute data. These representations illustrate the relationships that exist within each peer mentoring site. In each representation, an arrow indicates the direction of an interaction. If the recipient of a message reciprocates the interaction, an arrow will lead back to the originating actor. So, the pair of actors would have a line between them with an arrow at each end pointing to each actor.

This researcher used UCINET to calculate degree centrality scores for each actor in each network. Additionally, this researcher calculated density and centralization for each of the peer mentoring sites using UCINET to provide greater insight into the dynamics of the relationships in these settings. This researcher determined the degree
centrality scores for each actor in the peer mentoring sites for the Fall and Winter terms of the 2008-9, 2009-10, and 2010-11 academic years using UCINET software (Borgatti, Everett, & Freeman, 2002). The degree centrality scores measure the ties that each actor receives and directs in the network. The in-degree centrality calculation measures the ties an actor receives. The out-degree centrality calculation measures the ties an actor directs. According to Hanneman & Riddle (2005), if an actor receives many ties, they are considered prominent or have a high level of prestige. An actor who receives communications from many other students will have a high in-degree score. If an actor directs information to many others or makes others aware of their views, this actor would have a high out-degree score (Hanneman & Riddle, 2005). Actors receiving high outdegree scores, according to Hanneman & Riddle (2005), are said to be influential.

This researcher also calculated the centralization score and density score for each of the peer mentoring sites as a whole. The centralization score describes the way that activity is organized around particular focal points in a graph (Scott, 1991). Density describes the general level of cohesion in a graph (Scott, 1991). Density values range from 0 to 1, with 1 being the most dense. The density level of relationship ties for each of the peer mentoring sites considered in this study was calculated. Table 6 shows the results.
Table 6

Social Network Analysis Density Measures and Tie Totals for MS1 - MS6

<table>
<thead>
<tr>
<th>Measure</th>
<th>Fall 2008-9</th>
<th>Winter 2008-9</th>
<th>Fall 2009-10</th>
<th>Winter 2009-10</th>
<th>Fall 2010-11</th>
<th>Winter 2010-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Density</td>
<td>.231</td>
<td>.110</td>
<td>.188</td>
<td>.0176</td>
<td>.028</td>
<td>.083</td>
</tr>
<tr>
<td>Number of Ties</td>
<td>360</td>
<td>269</td>
<td>51</td>
<td>11</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

4.1.1 MS1 (Fall 2008-9)

The density score for the Fall 2008-9 peer mentoring site (MS1) shows that 23.1% of all possible ties that could have been made between the participants in this network are present. The Fall 2008-9 site was the most active of all sites examined with 360 ties established out of a possible 1560.

Figure 2 displays the sociogram as drawn in NetDraw for the Fall Term 2008-9 peer mentoring site (MS1). This figure demonstrates that all twenty-one (21) first-year students established ties with other participants in this setting. Fifteen (15) out of the sixteen (16) third-year students formed ties with other participants. All of the facilitators formed ties with other participants. Seven (7) of the forty (40) participants in this site participated in a prior peer mentoring site. All seven (7) of these participants established ties with others in this site.

Actors 23 and 18, both first-year students, have the highest in-degree scores, 25 and 20 respectively, showing these students are very prominent. Figure 2 shows that there is one isolate in this setting, actor 4, a third-year student. Actors 26 and 18, both
first-year students, have the highest out-degree scores, 33 and 26 respectively. These scores show that they are the most influential in this network. The highest in-degree and out-degree scores show the first-year students hold the most prominence and influence in this setting. Table 7 provides a listing of these results.

The majority of the central actors in this setting are first-year students, indicating that the first-year students had a strong presence in this setting. The mean score for in-degree communication was 9.00. This score was lower than the scores that actors 23 and 18 received. The mean score for out-degree communication in the network is 9.00. This score is also lower than the high scores the actors 26 and 18 received, which are showing the network average was considerably lower than these scores.
Figure 2. Sociogram of MS1 indicating participants' program level and participation in more than one peer mentoring setting. Blue represents third-year students. Yellow represents first-year students. Grey represents facilitators. The black lines indicate established ties between actors in this network. Larger nodes indicate that a student has participated in more than one peer mentoring setting.

The network centralization scores for the Fall 2008-9 peer mentoring site is 63.116% for outgoing communication and 42.078% for incoming communication.

The network centralization score for outgoing communication shows a more
Table 7

**MS1 (Fall 2008-9): Comparison of High Score Results for Degree Centrality with Mean Scores**

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Place</th>
<th>Actor</th>
<th>Level in the Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>1</td>
<td>23</td>
<td>First year</td>
<td>25</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>18</td>
<td>First year</td>
<td>20</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>Third year</td>
<td>19</td>
<td>9.00</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>26</td>
<td>First year</td>
<td>33</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>18</td>
<td>First year</td>
<td>26</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>Third year</td>
<td>20</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>20</td>
<td>First year</td>
<td>20</td>
<td>9.00</td>
</tr>
</tbody>
</table>

centralized network, where a few participants are at the center of information exchange. In this type of setting, information often passes through the central figures before reaching others. The network centralization score for communications directed to participants are somewhat centralized. These scores indicate that information was directed to more than a few central figures.

Figure 3 displays the network data for MS1 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 3 shows that the network was made up of mostly female participants. The three (3) male participants were active members of this network. Students in the younger and older age range form the periphery in this network. The single isolate, who is White, non-Hispanic, is on the higher end of the age range, female, and from New Jersey. The central figures in this
setting represent the low, mid, and high end of the age range. The site population for MS1 was composed of twenty-three (23) participants from Pennsylvania, 57.5% of the total participants in this site. Additionally, MS1 consisted of seven (7) participants from New Jersey (17.5%), two (2) from New York (5%), two (2) from Texas (5%), and two (2) from Arizona (5%). One (1) participant from each of the following states was enrolled in MS1: Washington State (2.5%), Kentucky (2.5%), California (2.5%), and Connecticut (2.5%). The participants with established ties for MS1 consisted of twenty-three (23) participants from Pennsylvania, six (6) participants from New Jersey, two (2) participants from Arizona, two (2) participants from Texas, and two (2) participants from New York. Additionally, one (1) participant from each of the following states established ties in MS1: Washington State, Kentucky, California, and Connecticut. The central actors in MS1 were from New Jersey and Pennsylvania. The peripheral actors were from Arizona, California, and Connecticut.

In terms of ethnicity, the majority of students with established ties are White, non-Hispanic. Ten (10) of the students with established ties did not disclose their ethnicity, three (3) are African-American, two (2) are Asian-American, and two (2) are Puerto-Rican American.
Figure 3. Sociogram of MS1 with gender, age, geographic location, and ethnicity. Males are represented in blue. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 21 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant's ethnicity. A square represents a White, non-Hispanic participant. A circle indicates the participant provided no ethnic information. An up triangle indicates the participant is African-American. A down triangle indicates the participant is Asian or from the Pacific Islands. A box indicates the participant is Puerto-Rican American.
4.1.2 MS2 (Winter 2008-9)

The Winter 2008-9 peer mentoring site (MS2) had a density score of 11%. This shows a network with a low density, indicating little cohesion in this network. There were 269 ties made in this setting out of a possible 2352. Figure 4 displays the network as drawn in NetDraw for the Winter Term 2008-9 peer mentoring site (MS2). This figure demonstrates that eleven (11) out of twelve (12) third-year students established ties with others in this setting. Seventeen (17) out of thirty-four (34) first-year students formed ties with other participants. The isolates in this network consisted of seventeen (17) first-year students and one (1) third-year student. All three (3) of the facilitators formed ties with other participants, one being a somewhat central figure.

Ten (10) of the forty-nine (49) participants in this site participated in a prior peer mentoring site. Eight (8) of whom established ties with others in this site. Actor 7, a third-year student, and actor 46, a first-year student, have the highest in-degree scores, 21 and 18 respectively, showing these students are very prominent. Actors 7 and 46 also have the highest out-degree scores, 23 and 18 respectively. These scores show that these actors are the most influential and the most prominent in this network. Table 8 provides a listing of these results.

The mean score for in-degree communication was 5.094. This score was lower than the scores that actors 7 and 46 received. The mean score for out-degree communication in the network is 5.094. This score is much lower than the high scores the actors 7 and 46 received, which are showing the network average was considerably lower than these scores.
The network centralization scores for the Winter 2008-9 peer mentoring site are 37.326% for outgoing communication and 33.073% for incoming communication. The centralization score for outward communications shows that the advice-seeking and information sharing patterns for the participants are somewhat centralized. The network centralization score for established ties based on receipt of communications from others in this network shows that the advice-seeking and information sharing patterns for the participants is less centralized.

Figure 4. Sociogram of MS2 showing participants’ program level and participation in more than one peer mentoring setting. Blue represents third-year students. Yellow represents first-year students. Grey represents facilitators. The black lines indicate established ties between actors in this network. Larger nodes indicate that a student has participated in more than one peer mentoring setting.
Figure 5 displays the network data for MS2 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 5 shows that the network was made up of mostly female participants. The single male participant, who did not disclose his ethnicity, was in the younger age range. Additionally, this participant, who was from New Jersey, established a tie with only one other actor. Students in the lower age range form the periphery in this network. The isolates in this network, mostly in the mid-range in terms of age, are all female. In terms of age, one of the older students in this setting assumed

Table 8

*MS2 (Winter 2008-9): Comparison of High Score Results for Degree Centrality with Mean Scores*

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Place</th>
<th>Actor</th>
<th>Level in the Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>1</td>
<td>7</td>
<td>Third Year</td>
<td>21</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>46</td>
<td>First Year</td>
<td>18</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
<td>Third Year</td>
<td>16</td>
<td>5.094</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>7</td>
<td>Third Year</td>
<td>23</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>46</td>
<td>First Year</td>
<td>18</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>Third Year</td>
<td>17</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
<td>Third Year</td>
<td>17</td>
<td>5.094</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
<td>Third Year</td>
<td>17</td>
<td>5.094</td>
</tr>
</tbody>
</table>
Figure 5. Sociogram of MS2 with gender, age, geographic location, and ethnicity. Males are represented in blue. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 23 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant's ethnicity. A square represents a White, non-Hispanic participant. A circle indicates the participant provided no ethnic information. A down triangle indicates the participant is Asian or from the Pacific Islands. A box indicates the participant is Puerto-Rican American. A circle in a box indicates the participant is Hispanic. A diamond indicates the participant is Cuban. The text label indicates the state or province in which the student resides.

...a central role while the other student is on the periphery of this network.

The site population for MS2 was composed of twenty-five (25) participants from Pennsylvania, 51%. Additionally, MS2 consisted of ten (10) participants from New Jersey (20.4%), four (4) from New York (8.1%), and two (2) from Virginia (4%). One
(1) participant from each of the following states were also part of MS2: Maryland (2%), Arizona (2%), Kentucky (2%), Connecticut (2%), Washington State (2%), California (2%), Puerto Rico (2%), and Florida (2%). The participants with established ties for MS2 consisted of seventeen (17) participants from Pennsylvania, six (6) participants from New Jersey, and two (2) participants from New York. Additionally, one (1) participant from each of the following states had established ties in MS2: Arizona, Virginia, Kentucky, Maryland, and Connecticut. The central actors in MS2 were from New Jersey and Pennsylvania. The peripheral actors were also from New Jersey and Pennsylvania. In terms of ethnicity, the majority of students with established ties are White, non-Hispanic. Four (4) of the students with established ties did not disclose their ethnicity and two (2) are Asian-American.

4.1.3 MS3 (Fall 2009-10)

The density score for the Fall 2009-10 peer mentoring site (MS3) is 18.8%. This shows a network with a somewhat low density. The students in this setting interacted directly in this site with just a few other participants. There were 51 ties made in this setting out of a possible 306. Figure 6 displays the network as drawn in NetDraw for the Fall Term 2009-10 peer mentoring site (MS3). This figure demonstrates that four (4) out of the five (5) third-year students established ties with others in this setting. Nine (9) out of the ten (10) first-year students formed ties with other participants. One (1) of the three (3) facilitators formed ties with other participants. The isolates in this network were actors, 4, 11, 17, and 18. The isolates consisted of one (1) third-year student, one (1) first-year student, and two (2) facilitators.
Figure 6. Sociogram of MS3 showing participants' program level and participation in more than one peer mentoring setting. Blue represents third-year students. Yellow represents first-year students. Grey represents facilitators. The black lines indicate established ties between actors in this network. Larger nodes indicate that a student has participated in more than one peer mentoring setting.

Five (5) of the eighteen (18) participants in this site had participated in a prior peer mentoring site. Actors 1 and 3, both third-year students, have the highest in-degree scores, 8 and 7 respectively, showing these students are very prominent. Actors 1 and 3 have the highest out-degree scores, 10 and 8, respectively. Actors 1 and 3, having the
highest indegree and outdegree scores, are both the most influential and prominent
students in this setting. Table 9 provides a listing of these results.

Table 9

MS3 (Fall 2009-10): Comparison of High Score Results for Degree Centrality with Mean
Scores

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Place</th>
<th>Actor</th>
<th>Level in the Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>1</td>
<td>1</td>
<td>Third Year</td>
<td>8</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>Third Year</td>
<td>7</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>First Year</td>
<td>6</td>
<td>2.83</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>1</td>
<td>Third Year</td>
<td>10</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>Third Year</td>
<td>8</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>9</td>
<td>First Year</td>
<td>5</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>16</td>
<td>First Year</td>
<td>5</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>First Year</td>
<td>5</td>
<td>2.83</td>
</tr>
</tbody>
</table>

The mean score for out-degree communication in the network is 2.83. These
scores are lower than the high scores the actors 1 and 3 received for both indegree and
outdegree. Additionally, these scores show the network average was considerably lower
than these scores. The mean score for in-degree communication was 2.83.

The network centralization scores for the Fall 2009-10 peer mentoring site is
44.637% for outgoing communication and 32.180% for incoming communication. The
network centralization score for ties based on outward communications shows the
patterns for the participants in this respect are somewhat centralized. This means that the
students were likely to reach out to a small group of individuals to establish ties for advice or to share information. The network centralization score for established ties based on receipt of communications from others in the network shows that the patterns based on receipt of information for the participants had a lower level of centralization.

Figure 7 displays the network data for MS3 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 7 shows that the network was made up of all female participants from Pennsylvania. Students in the lower age range form the periphery in this network. The isolates in this network are mostly in the median age range. Two (2) of these participants are White, non-Hispanic; one (1) did not provide ethnicity information. The site population for MS3 was composed of thirteen (13) participants from Pennsylvania, 72.2%. Additionally, MS3 consisted of three (3) participants from New Jersey (16%) and one (1) participant from each of the following states were part of MS3: New York (5%) and Puerto Rico (5%). The participants with established ties for MS3 consisted of ten (10) participants from Pennsylvania and two (2) participants from New Jersey. Additionally, one (1) participant from each of the following states had established ties in MS3: New York and Puerto Rico. The central actors in MS3 were from New Jersey and Pennsylvania. The peripheral actors were from Pennsylvania. In terms of age, the central figures fall in the younger age range. In terms of ethnicity, eleven (11) White, non-Hispanic participants established ties with other participants. Two (2) African-American participants and one (1) Cuban participant established ties with others. Four (4) of the students with established ties did not disclose their ethnicity. The central figures are White, non-Hispanic.
Figure 7. Sociogram of MS3 with gender, age, geographic location, and ethnicity. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 21 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant's ethnicity. A square represents a White, non-Hispanic participant. A circle indicates the participant provided no ethnic information. An up triangle indicates the participant is African American. A diamond indicates the participant is Cuban. The text label indicates the state or province in which the student resides.
4.1.4 MS4 (Winter 2009-10)

MS4, the peer mentoring site for the Winter 2009-10 term, has a density score of 1.7%. This score was the lowest for all of the mentoring sites studied. There were 11 ties made in this setting out of a possible 650. This is a relatively small percentage of interaction, showing that the students established ties with only a few other members of the site.

Figure 8 displays the network as drawn in NetDraw of the peer mentoring site that occurred during the Winter Term of the 2009-10 (MS4) academic year. This figure demonstrates that four (4) out of five (5) third-year students established ties with others in this setting. Two (2) of the nineteen (19) first-year students formed ties with other participants. One (1) of the two (2) facilitators formed ties with other participants. Four (4) of the twenty-six (26) participants were part of another peer mentoring site. Actor 4, a third-year student, and actor 6, a first-year student, have the highest in-degree score, 3, showing these students are very prominent. Actors 4, 2, and 5, all third-year students, have the highest out-degree score, 3. These scores show that these participants are the most influential in this network. Actor 4, receiving high out- and in-degree scores, has both prominence and influence in this setting. Figure 8 shows that there were many isolates in this setting. The isolates consisted of seventeen (17) first-year students, one (1) third-year student, and one (1) facilitator. This indicates that many students chose not to interact directly with others in this peer mentoring site.

The mean score for in-degree communication was .423. This score was lower than the scores that actors 4 and 6 received. The mean score for out-degree communication in the network is .423. This score is much lower than the high scores the
actors 4, 2, and 5 received, which are showing the network average was considerably lower than these scores. Table 10 provides a listing of these results.

Figure 8. Sociogram of MS4 showing participants’ program level and participation in more than one peer mentoring setting. Blue represents third-year students. Yellow represents first-year students. Grey represents facilitators. The black lines indicate established ties between actors in this network. Larger nodes indicate that a student has participated in more than one peer mentoring setting.
The centralization scores for the Winter 2009-10 peer mentoring site is 10.72% for outgoing communication and 10.72% for incoming communication. The network centralization score for outward communications shows that the advice-seeking and information-sharing patterns for the participants are less centralized. This means the students were likely to reach out to a varied number of participants and not focus on establishing relations with one particular participant. The network centralization score for established ties based on receipt of communications from others in the network shows that the advice-seeking and information sharing patterns for the participants are also less centralized.
### Table 10

**MS4 (Winter 2009-10): Comparison of High Score Results for Degree Centrality with Mean Scores**

<table>
<thead>
<tr>
<th>Degree Centrality Score</th>
<th>Place</th>
<th>Actor</th>
<th>Level in the Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td></td>
<td>Third Year</td>
<td>3</td>
<td>.423</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td></td>
<td>First Year</td>
<td>3</td>
<td>.423</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td></td>
<td>Third Year</td>
<td>2</td>
<td>.423</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td></td>
<td>Third Year</td>
<td>1</td>
<td>.423</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td></td>
<td>First Year</td>
<td>1</td>
<td>.423</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
<td></td>
<td>Facilitator</td>
<td>1</td>
<td>.423</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>4</td>
<td>Third Year</td>
<td>3</td>
<td>.423</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td></td>
<td>Third Year</td>
<td>3</td>
<td>.423</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td></td>
<td>Third Year</td>
<td>3</td>
<td>.423</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td></td>
<td>Third Year</td>
<td>1</td>
<td>.423</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td></td>
<td>First Year</td>
<td>1</td>
<td>.423</td>
</tr>
<tr>
<td>3</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>.423</td>
</tr>
</tbody>
</table>
Figure 9. Sociogram of MS4 with gender, age, geographic location, and ethnicity. Males are represented in blue. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 21 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant's ethnicity. A square represents a White, non-Hispanic participant. A circle indicates the participant provided no ethnic information. An up triangle indicates the participant is African-American. A down triangle indicates the participant is Asian or from the Pacific Islands. A box indicates the participant is Puerto-Rican American. The text label indicates the state or province in which the student resides.

Figure 9 displays the network data for MS4 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 9 shows that the majority of the network was made up of female participants. Students in the lower age range are the central actors in this setting. The isolates in this network consist of participants in the low, median, and high end of the age range. The site population for
MS4 was predominately composed of eleven (11) participants from Pennsylvania, 42%. Additionally, MS4 consisted of six (6) participants from New Jersey (23%), and three (3) from New York (11.5%). One (1) participant from each of the following states were also part of MS4: Arizona (3.8%), Washington State (3.8%), California (3.8%), Kentucky (3.8%), Connecticut (3.8%), and Tennessee (3.8%). The participants with established ties for MS4 consisted of five (5) participants from Pennsylvania, one (1) participant each from New Jersey and Tennessee. The central actors in MS4 were from Pennsylvania and New Jersey. The peripheral actors were from Pennsylvania and Tennessee. In terms of ethnicity, the majority of students with established ties are White, non-Hispanic. Two (2) of the students with established ties did not disclose their ethnicity. Of the two (2) Asian-American participants in this site, one (1) remained and one (1) established a tie.

4.1.5 MS5 (Fall 2010-11)

The density score for the Fall 2010-11 peer mentoring site (MS5) shows that 2.8% of all possible ties in this network are present. With only 2 ties established out of a possible 72 in this setting, the small density score correlates with this number. The density score, like the score that MS4 received, demonstrates a very low amount of cohesion in this setting.

Figure 10 displays the network as drawn in NetDraw of the peer mentoring site that occurred during the Fall Term of the 2010-11 academic year. This figure demonstrates that both of the third-year students in this site established ties with others in this setting. None of the five (5) first-year students formed ties with other participants. One (1) of the two (2) facilitators formed ties with other participants.
Two (2) of the nine (9) participants in this site had participated in another peer mentoring site. Actor 2, a third-year student, has the highest in-degree score, 2, showing this student is very prominent. Actor 3, a third-year student, and actor 8, a facilitator, have the highest out-degree score of 1. These scores show that they are the most influential in this network. Figure 10 shows that there were many isolates in this setting, actors 4, 5, 6, 7, 9, and 10. The isolates consisted of five (5) first-year students and one (1) facilitator.

The mean score for out-degree communication in the network is .222. This score is much lower than the high scores the actors 3 and 8 received, 1, showing the network average was considerably lower than the score these actors received. The mean score for in-degree communication was .222, which was much lower than the score that actor 2 received. Table 11 provides a listing of these results.

The centralization scores for the Fall 2010-11 peer mentoring site is 10.938% for outgoing communication and 25.00% for incoming communication. The network centralization score for outward communications shows that the advice-seeking and information sharing patterns for the participants are very decentralized. This means that the students were likely to reach out to many other participants and not focus on one particular participant. The network centralization score for established ties based on receipt of communications from others in the network shows that the advice-seeking and information sharing patterns for the participants are slightly more centralized.
Figure 10. Sociogram of MS5 showing participants' program level and participation in more than one peer mentoring setting. Blue represents third-year students. Yellow represents first-year students. Grey represents facilitators. The black lines indicate established ties between actors in this network. Larger nodes indicate that a student has participated in more than one peer mentoring setting.
Table 11

**MS5 (Fall 2010-11): Comparison of High Score Results for Degree Centrality with Mean Scores**

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Place</th>
<th>Actor</th>
<th>Level in The Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>1</td>
<td>2</td>
<td>Third Year</td>
<td>2</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>.222</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>3</td>
<td>Third Year</td>
<td>1</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>8</td>
<td>Facilitator</td>
<td>1</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>.222</td>
</tr>
</tbody>
</table>

Figure 11 displays the network data for MS5 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 11 shows that the network was made up of all female participants. Students in the lower age range form the periphery in this network. The isolates in this network total six (6). Five (5) of the isolates are White, non-Hispanic. One (1) of the isolates is African-American. One (1) of the isolates is a facilitator. The participants who are isolates are mostly in the younger age range. Additionally, the oldest participant in this network did not form ties with others. The central figures are in the median age range. Three (3) students in the younger age range established ties with others.
Figure 11. Sociogram of MS5 as drawn in NetDraw with the attribute data of gender, age, geographic location, and ethnicity. Males are represented in blue. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 21 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant’s ethnicity. A square represents a White, non-Hispanic participant. An up triangle indicates the participant is African-American. The text label indicates the state or province in which the student resides.

The site population for MS5 was composed of seven (7) participants from Pennsylvania, 77.77%. Additionally, MS5 consisted of one (1) participant each from New Jersey (11.11%) and Maryland (11.11%). The participants with established ties for MS5 consisted of three (3), who were all from Pennsylvania. The central actor in MS5 was from Pennsylvania. The peripheral actors were also from Pennsylvania.
In terms of ethnicity, eight (8) students are White, non-Hispanic. All students with established ties list their ethnicity as White, non-Hispanic. One student, an isolate, is African-American.

4.1.6 MS6 (Winter 2010-11)

The density score for the Winter 2010-11 peer mentoring site (MS6) shows that 8.3% of all possible ties in this network are present. MS4, MS5, and MS6 all received scores lower than 10%. These scores show that the students established very few connections of all that were possible. Based on the density scores, the sites in this study show that students were likely to directly communicate with only a relatively small percentage of students and not connect with all of the participants.

Figure 12 displays the network as drawn in NetDraw of the peer mentoring site that occurred during the Winter Term of the 2010-11 academic year. This figure demonstrates that four (4) out of the five (5) third-year students established ties with others in this setting. Two (2) out of the six (6) first-year students formed ties with other participants. One (1) of the two (2) facilitators formed ties with other participants. Figure 12 shows that there were six (6) isolates in this setting, actors 1, 6, 9, 10, 11, and 13. The isolates consisted of four (4) first-year students, one (1) third-year student, and one (1) facilitator.
The interactions show that 13 out of 156 possible ties were made. Four (4) of the thirteen (13) participants were in another peer mentoring site. The majority of students with established ties in this network are third-year students. Actors 7 and 8, both first-year students, have the highest in-degree score, 3, showing these students are very prominent. Actor 4, a third-year student, has the highest out-degree score of 4. This score shows that this actor is the most influential in this network.
The mean score for in-degree communication was 1.00. This score was lower than the score that actors 7 and 8 received. The mean score for out-degree communication in the network is 1.00. This score is lower than the high scores actors 4, 7, and 8 received. Table 12 provides a listing of these results.

Table 12

*MS6 (Winter 2010-11): Comparison of High Score Results for Degree Centrality with Mean Scores*

<table>
<thead>
<tr>
<th>Degree Centrality</th>
<th>Place</th>
<th>Actor</th>
<th>Level in the Program</th>
<th>Score</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-degree</td>
<td>1</td>
<td>7</td>
<td>First Year</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>8</td>
<td>First Year</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5</td>
<td>Third Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4</td>
<td>Third Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>Third Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>Third Year</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Out-degree</td>
<td>1</td>
<td>4</td>
<td>Third Year</td>
<td>4</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>Third Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7</td>
<td>First Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>8</td>
<td>First Year</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>Third Year</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5</td>
<td>Third Year</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>12</td>
<td>First Year</td>
<td>1</td>
<td>1.00</td>
</tr>
</tbody>
</table>
The centralization scores for the Winter 2010-11 peer mentoring site are 27.083% for outgoing communication and 18.056% for incoming communication. The network centralization score for outward communications shows that the advice-seeking and information sharing patterns for the participants are somewhat decentralized. Information may have to pass through a number of participants to reach the entire group. The network centralization score for established ties based on receipt of communications from others in the network shows that the advice-seeking and information sharing patterns are less decentralized.

Figure 13 displays the network data for MS6 as drawn in NetDraw with the attribute data of gender, age, ethnicity, and geographic location. Figure 13 shows that the network was made up of mostly female participants. The single male student is an isolate in this setting and in the median age range. Students in the lower age range form the center of this network. The isolates in this network are mostly in the median range in terms of age with one (1) being in the older age range and one (1) being in the younger age range. The site population for MS6 was predominately composed of eight (8) participants from Pennsylvania, 61.5%. Additionally, MS6 consisted of three (3) participants from New Jersey (23.07%). One (1) participant from each of the following states were also part of MS6: California (7.69%) and Tennessee (7.69%). The participants with established ties for MS6 consisted of five (5) participants from Pennsylvania. Additionally, one (1) participant from each of the following states had established ties in MS6: New Jersey and Tennessee. The central actors in MS6 were from New Jersey, Pennsylvania, and Tennessee. The peripheral actors were from Pennsylvania.
In terms of ethnicity, ten (10) students are White, non-Hispanic. One student, an isolate, is African-American. One student with established ties is Puerto Rican American.

Figure 13. Sociogram of MS6. Males are represented in blue. Females are represented in green. The lines indicate established ties between actors in this network. The size of the nodes indicates age, which ranges from 21 to 60. Node size ranges from small, indicating the youngest participants to large, indicating the oldest participants. Shape indicates a participant's ethnicity. A square represents a White, non-Hispanic participant. A circle indicates the participant provided no ethnic information. An up triangle indicates the participant is African-American. A down triangle indicates the participant is Asian or from the Pacific Islands. A box indicates the participant is Puerto Rican American. A circle in a box indicates the participant is Hispanic. A diamond indicates the participant is Cuban. The text label indicates the state or province in which the student resides.
4.2 Interpretive content analysis

Results of the interpretive content analysis provide details about what the students discussed in the six (6) peer mentoring sites selected for this study. This researcher began the interpretive content analysis by chronologically organizing the discussion board postings within each peer mentoring site selected for this study. Next, this researcher read and re-read the discussion threads for patterns of key issues, recurrent events, or activities in the students' interactions.

The analysis continued with the coding process suggested by Creswell (2003). The coding process entailed organizing the material into chunks based on patterns that began to emerge. This part of the process consisted of taking the raw discussion board data and creating categories based on the students' postings and their interactions with one another. The categories that emerged were given descriptor phrases, i.e. codes, which emerged from the collected data. All of the data were accounted for under these codes. Table 13 provides the codes that emerged from the review and re-reviews of the discussion board posts. A discussion board post is provided to illustrate an example of each code.

The codes enabled this researcher to generate themes to reflect the interactions of the students in the peer mentoring settings and the function the sites assumed for the students. Following the identification of the codes, the data was re-examined to collect, group, and re-group all incidents of reference to the identified codes. This researcher was able to recognize emergent themes from coded information and provide supporting participant quotes for each theme from the selected peer mentoring sites (Creswell, 2003).
Table 13

*Emergent Codes with example Discussion Posts*

<table>
<thead>
<tr>
<th>Emergent Code</th>
<th>Characteristic Example Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Issues (i.e. technology and online learning)</td>
<td>I liked taking the computer version of the Praxis test. It allows you to mark questions you want to go back to so you don’t forget to go back; The format of online classes is a bit confusing at first, but you’ll get the hang of it!</td>
</tr>
<tr>
<td>Mentoring</td>
<td>I enjoy every minute of these classes as well - the further you go, the more you learn. Your confidence will grow the more you spend time in a classroom.</td>
</tr>
<tr>
<td>Portfolio Development</td>
<td>Save anything and everything you think might be important. Even papers that you have to write. Just about anything can be considered as an artifact for your portfolio.</td>
</tr>
<tr>
<td>Resources for New Teachers</td>
<td>I have observed teachers use job charts in order to keep the class running efficiently. The students each know their tasks, which keeps things moving - this helps to use time well, and provides more opportunity for teaching/learning.</td>
</tr>
<tr>
<td>Praxis Exams (i.e. preparation and experiences)</td>
<td>For the students that have taken the Praxis, did you feel that there was enough time to finish comfortably or were you at all rushed?</td>
</tr>
<tr>
<td>Pre-Student Teaching (i.e. experiences, application process, and schedule)</td>
<td>Today, I am seeing two classes. I am going into 2nd grade in the morning to see them using their centers during language arts and to view the teacher doing some guided reading.</td>
</tr>
<tr>
<td>Classroom Management techniques</td>
<td>I have seen this method and I have also seen the &quot;code word&quot; method. The teacher will say &quot;hot&quot; and the students will have to say &quot;pocket&quot; and the class settles down. I think that one is a bit silly for older students.</td>
</tr>
<tr>
<td>Grade-Level Preference</td>
<td>If you try subbing at different grade levels and subjects you will find you prefer some more than others.</td>
</tr>
<tr>
<td>Struggling Students</td>
<td>Parents may get rather frustrated if all they ever get are bad reports about their child - good reports are a great way to ensure parents that you notice and reward good behavior as well.</td>
</tr>
<tr>
<td>Student Behavior</td>
<td>I think it is very important to handle all of the student situations with professionalism and respect. There may be things going on in the student’s home life that the teacher is not fully aware of.</td>
</tr>
<tr>
<td>Time Management</td>
<td>For pre-student teaching, I broke my four hours a week down into two days. On Mondays and Fridays I go in for two hours each. I don’t work but I do have a 3 year old who is not in daycare. My challenge was finding someone to watch him that doesn’t cost a ton. So far it is working out well I just hope it stays that way.</td>
</tr>
<tr>
<td>Emergent Code</td>
<td>Characteristic Example Posts</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Program Planning</td>
<td>Also, you want to be aware that there are deadlines for student teaching applications—for instance, for the Spring quarter, the application had to be in by 30 September.</td>
</tr>
<tr>
<td>Course Registration (i.e. issues and recommendation)</td>
<td>What history class are you taking? I still need to take a Philadelphia History I think that sounds really interesting. I was wondering if that is the one you are taking.</td>
</tr>
<tr>
<td>Course Experience</td>
<td>I am taking Math 182 right now. It's a challenge, but if you stick with it—really go through the lectures thoroughly and make sure you understand everything they are covering, you should be OK. Don't underestimate reading through the book also—some of the questions on the quiz/test are parallels of the example questions in the book.</td>
</tr>
<tr>
<td>Special Education</td>
<td>Many first year teachers are very overwhelmed by the paperwork, strategies and lessons that are associated with our special education students. I have found that once you have all the information about the student things are much easier and it doesn't seem all that hard.</td>
</tr>
<tr>
<td>Teaching (i.e. what to consider for the future)</td>
<td>I realize what it takes to understand the complexity of the classroom, students, parents, standards, faculty and district needs. I had not realized all of the aspects involved and the multiple dynamics of 'just teaching' to a class. Planning, understanding, integrating— as well as teaching to diverse learners—wow—so much to do. I know that I have always wanted to not only make a difference, but impact others in a positive way—especially children.</td>
</tr>
<tr>
<td>Parents</td>
<td>What I have discovered is that parents are heavily involved in the Elementary Level but when they get to the High School they are not involved. Parent teacher conferences are not attended and we have the same parents volunteering their time and energy to help with fundraising.</td>
</tr>
<tr>
<td>Work Experience</td>
<td>That's a really good idea. I work for an after school program at the school where I student teach. I always had the opportunity to do any tutoring I needed to do at the school. It has really worked out for me. Any of the 105 students could try that too. It has really opened a lot of doors for me. It has been a great advantage!</td>
</tr>
<tr>
<td>Geographic Location</td>
<td>Talk about a small world - I graduated from Honesdale High - and we go there all the time!!! I am also in Wayne County - my son goes to Preston in Lake Como! We are neighbors!!! Glad to meet you!</td>
</tr>
<tr>
<td>Challenges</td>
<td>One challenge I had were the many hats I wear every other day. Balancing everything was and still is a tough act! In the end it will be worth it.</td>
</tr>
<tr>
<td>Substitute Teaching</td>
<td>I was a substitute and I found it was easy to stand and teach in front of a group of students when I had knowledge in the specific field in which I was filling in for. This helped to build my confidence.</td>
</tr>
<tr>
<td>Emergent Code</td>
<td>Characteristic Example Posts</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Gratitude for Advice</td>
<td>Thanks for your input everyone, it makes me feel so much better that time doesn't seem to be much of an issue. - You don't know how helpful this post was for me! Knowing that I am not the only one helps me very much.</td>
</tr>
<tr>
<td>Lesson Planning</td>
<td>My brain is swirling because I just read in my EDUC class that we have to create a lesson plan! I just read through the 8 page (yikes!) lesson plan template. Any words of advice?</td>
</tr>
<tr>
<td>Family Life</td>
<td>I live in PA with my husband and children who are in grade school.</td>
</tr>
</tbody>
</table>

### 4.2.1 Themes

Through the analyses, this researcher identified five themes: (1) The students followed the weekly prompts provided by the facilitators, (2), the students engaged in cross-level and same-level peer mentoring, (3) the scope of the peer mentoring sites expanded beyond general information-sharing among the participants, (4) the students exhibited positive experiences in the peer mentoring sites, and (5) at times, the students diverted from the prompts provided by the facilitator and elected to use the sites in a broader fashion to gather and share information with one another. Each theme will be discussed in greater detail. Quotations from the discussion board postings are supplied to exemplify each theme. The examples appear just as their authors sent them, with grammar, spelling, and usage choices unedited.

**Theme 1:** It was observed that the students followed the prompts that the facilitators provided for the weekly discussions. The prompts were developed by the peer mentoring site facilitators in conjunction with the program director to address topics pertaining to course and program completion. The prompts are intended to function as a catalyst to initiate communications among the student participants. It was observed that the students used the peer mentoring sites to both ask for and provide advice and
guidance on questions relating to completing the education degree requirements and the teaching profession generally. Students were found to have shared information pertinent to topics as provided by the program facilitator.

The excerpts that follow provide examples of experiences with pre-student teaching and interactions with cooperating teachers. Each post has been de-identified to uphold confidentiality. TY stands for a third-year student. FY stands for a first-year student.

Post: My favorite classroom management techniques

I think it is very important that the children know the expectations, routines and placement of resources within the classroom as soon as possible. This ensures that they understand what they are being asked to do when you have to redirect them. My co-op teacher noted that this takes up a good portion of the first few weeks of school, but is well worth the time investment. (MS3)

Post: classroom management

I am highly enthusiastic about what we are doing; the students tend to want to be involved with my lesson which frequently requires "volunteers from the audience." I only choose the children that are showing me that they are good listeners. Of course I don't know how this would work with older students and I am going to have to learn when I student teach older children in the fall. (MS2)

Post: classroom management

Your co-op sounds great! My kindergarten experience was very similar. My co-op also was soft spoken and was able to get and keep the attention of her students. I have learned so much from her in such a short time! (MS2)

Post: RE: Intro

It is more about observing and working with small groups of students. We create some lesson plans but we are mainly helping out the teacher and getting more prepared for our student teaching. It is 40 hours of observation in a school along with papers and developing your portfolio. So far it has been interesting and I am sure it will only get better. (MS1)
In the following discussion threads, the authors emphasize the importance of communication and describe experiences that support their perspective.

Post: RE: Teacher/Parent Relationships

When my son was in elementary school and I went to his conferences for his report card, the teacher would have all of his tests (which I had signed already) and other pieces of his work in his portfolio which was great because so much of the work I hadn't seen.

This way, I suppose if I had any questions about grades or other issues, she had everything in front of her. (MS2)

Post: RE: Parents

As parents we really, REALLY need to know the teacher is on our side in helping to support our child; I have seen too many times administration and teachers be non-emathetic and not sympathetic in a situation and it's disheartening. Frequent communication with each and every parent is crucial. As teachers we do not have to be their friends, but in having frequent communication we can hopefully put out the small flame before it turns into a fire! (MS3)

Post: RE: Parents

“Great advice. Frequent communication is a great way to catch a fire before it starts!” (MS3)

The following discussion began with a student asking about the difficulty of the Praxis exams. Third-year students responded with their experiences and encouragement for the student to prepare for the exams beforehand.

Post: ???

“How hard was the Praxis I test? I am scheduled to take it in a few weeks!” (MS1)
Post: RE:???

Praxis I was not bad. I took several practice test [sic] before hand to prepare myself. It is a long day if you take all three in the same day. My brain was so tired of working when I had finished!

Good Luck! (MS1)

Post: RE: Praxis I Tips

I purchased the book that they offer to help study for the Praxis. I went over everything in the book. It was not expensive and well worth every penny. It has practice sections on everything that is on the Praxis. I passed every section, so the proof is in the pudding:) (MS1)

Theme 2: Cross-level and same-level peer mentoring occurred among the student participants. It was observed that first-year students communicated with other first-year students regarding their questions and their experiences in the program. It was observed that third-year students used the sites to communicate with other third-year students on topics faced at their respective level in the program. It was also observed that first-year students interacted with the third-year students. This researcher found that over the course of each peer mentoring site, students were supporting others. Specifically, it was observed that students followed up with their fellow site participants to determine if an issue or situation discussed among the participants had been resolved. The students showed that they cared about their fellow participants. They wanted to discover how a situation developed for the students.

The following posts focus on participants’ pre-student teaching experiences. Third- and first-year students engaged in this discussion, offering their experiences to one another. Participants provided the experiences they had with their particular field placement as well as advice regarding how others can begin their placements in the future.
Post: RE: Advice

I found it difficult to find the time to pre student teach do [sic] to [sic] working full time also. However, I feel that any experience in the classroom can be learned from. It can teach what a good teacher is like or a poor teacher. Some teachers are nervous with students in their classroom and it doesn't always come off the right way. (MS2)

Post: RE: Questions

The first time I taught a lesson in front of 19 kindergarten [sic], I thought I was going to pass out. I was extremely nervous. Now I am much more comfortable. Two things aided this change; the first was the more you practice something, the better you get at it. The second was upon getting to know the students more, I now care for them and having a relationship with them takes away the nervousness. They adore me and I adore them. Now if I make a mistake, I even say well teachers make mistakes and that's okay! Also when you are in the moment and trying to teach them something, that becomes your focus. I am more interested in which children are getting the material and I am not focused on the act of being in front of them anymore.

That being said, I know that everytime I start with a new group, I will be nervous. I think that this is natural and part of teaching. Just keep going and don't ever give up!! (MS2)

Post: Classroom Management

While, at this point, I have only worked with small groups, I have noticed that a few of the teachers I have observed have used some of the same methods for the students. For example, when the students begin to get too loud, the teacher redirects their attention by clapping loudly in a rhythmic motion. The students immediately follow and they become quieter. (MS4)

Post: words of wisdom

"If your [sic] offered the opportunity to teach in your class, do it! Don't let nervousness hold you back." (MS3)

Post: Advice

Ask questions! Do not be too shy or think that your question is stupid - because it is not. Take full advantage of the knowledge that your cooperating teacher has. I have a great cooperating teacher and she has been a great support and full of great information for me.

Ask, Ask, Ask....................... (MS3)
The following post was part of a discussion between two first-year students regarding preparation for the mathematics section of the Praxis exams. The responding students provide practical advice based on their experiences to aid the questioning student focus his or her preparation for the exam.

Post: RE: Praxis I Tips

“What do you feel would be the best Math class to begin with?” (MS1)

Post: RE: Praxis I Tips

To be honest with you, I would not take a whole course on math just for this. It isn't that bad and if math is one of your strongest subjects, I would just try and get a hold of a math textbook and review. Also, I went to the local library and checked out a couple of books that they had on taking the Praxis. I used these just to take the quizzes but it really helped me get back into the swing of doing math problems. (MS1)

Post: RE: My Praxis Dilemma

I was terrified of the math! I studied with my then 4th and 5th grade sons. Its [sic] not as bad as you think. I borrowed a 5th grade math book and that helped too. Good luck! (MS1)

Post: RE: Praxis I Tips

I don't think a course will help you. The questions are probably 4th to 7th grade level math. The website has much more to offer, you should check it out. (MS1)

The following posts are excerpts from a discussion among third-year students regarding course scheduling.

Post: class picks

“I signed up for 114 - Science teaching methods. Maybe I'll see you there!” (MS1)
Post: class picks

I am taking Info 101: Intro to Information Technology. The class is great and the professor is wonderful. He is very supportive and the information is very useful. He has asked for feedback continuously and makes changes in the material accordingly - I think this was the first quarter it was offered. I highly recommend it. I will ask you the same question - any suggestions? (MS1)

Post: RE: Question for all!

“/I am taking US History to 1815. I still need to take the Phila history - which - unlike the current history course - does sound interesting!” (MS1)

The following posts are from a discussion regarding course scheduling.

Participants found similarities in their scheduling patterns. Additionally, one of the authors provides information regarding his/her own schedule and responsibilities.

Post: Introduction

Hi Everyone! This is my fifth quarter at Drexel. I recently quit my full-time job (teaching pre-k at a preschool) to concentrate on school (16 credit [sic] this quarter!) and planning my June wedding (which has proven to be a full-time job in itself). I'm excited to be starting my pre-student teaching this quarter. And I look forward to working with you all! (MS1)

Post: RE: Introduction

I thought I was crazy taking 4 classes at [sic] one shot! That is one thing I am nervous about is all of this student teaching. Unlike you, I cannot quit my full time job unless I know I have another job in the background. I am worried about this part, but I figure I am not going to get too worried until I am closer. Good luck! (MS1)

Post: RE: Introduction

You will be okay... just break it up so it fits your schedule. I am very fortunate that my fiancé has been so supportive. It has been a difficult road so far not working, but being able to be in the classroom has given me a glimpse of what the future holds!

Good Luck! (MS1)
The following discussion between two, third-year students began with a question regarding course scheduling with pre-student teaching. The responder provides encouraging advice to examine all aspects of his/her responsibilities and determine from there how many classes would be appropriate. The initiator then responds with his/her thoughts.

Post: Question

"Do you recommend taking any other courses when you are prestudent [sic] teaching? and the requirements for pre student teaching are the clearances, [sic] and passing the praxis 1 test?" (MS1)

Post: Question

I usually take three 3 hour classes plus my seminar, but I chose not to do that this quarter. I am only taking my EDU [sic] 320 class (the class that you take when you are pre-student teaching) and my seminar. The EDU [sic] 320 class is nine hours! It all depends on how much you can take on. I know that these two classes and my pre-student teaching were all I could handle this quarter. (MS1)

Post: Question

Pre students [sic] teaching is a writing intense course and they are not kidding. So far every week we have had 1 three page paper, part of our portfolio, and our observation log. We also have had a video to watch and 2-3 discussion boards. You would need to judge the amount of time you have available to give toward classes. I have been able to handle all 4 classes, but I have been fortunate to have time to truly devote to my [sic] them. (MS1)

Post: RE: Question

"I don't think I will be taking any other classes along with pre-student teaching. It sounds very time consuming. Everyone's answers were very helpful." (MS1)
Theme 3: The scope of the peer mentoring sites expanded beyond general information sharing among the participants regarding program and teacher certification requirements. Some of the peer mentoring site participants began to develop more personal rapport as indicated through the writing of posts that were supportive and personal. This researcher concludes that students felt adequately comfortable to communicate with one another more broadly, rather than strictly adhering to topics suggested by the instructor through prompts.

As conversations among the participants developed on the discussion board, it was observed that students began to share and learn more about one another, i.e. finding similarities in family life, work life, and experiences in courses. It was observed that some students engaged in discussions with one another based upon similarities in their personal lives. Specifically, it was observed they shared information about their experiences from current and prior work experiences, the reason for choosing this particular academic program, their field work in the program, and their own experiences as parents. Students were also observed sharing details about their geographic location, which enabled them to establish something in common with one another, aside from being students in the same academic program.

Post: Question for all

I feel much more at ease answering questions here on DB than I would in a classroom. I also believe that we have more classwork to complete than on campus students have. Even though some people might think you have all the time in the world to complete your work, you still have a family, [sic] and your daytime job to take care of. (MS1)

Post: Question for all

“I think that we will be more comfortable with technology, and I also feel I participate in class discussion [sic] alot more.” (MS1)
The students participating in the following discussion found that they live very close to one another.

Post: RE: Intro

"I do enjoy keeping busy! I am from Wayne County, about 20 miles north of Scranton. It takes us about 1 1/2 [sic] to get to Binghamton. We're nearly neighbors!!" (MS1)

Post: RE: Intro

Talk about a small world - I graduated from Honesdale High - and we go there all the time!!! I am also in Wayne County - my son goes to Preston in Lake Como! We are neighbors!!! Glad to meet you! I live close to the border in PA but the close towns are Hancock and Deposit.

Nice to meet you! (MS1)

Post: RE: Intro

"What a small world! I graduated from Western Wayne, which is where I work now and my boys attend. We only live about 11 miles from Honesdale. Nice to "meet" you, neighbor!!" (MS1)

Theme 4: This researcher noted that the students exhibited positive experiences in the peer mentoring sites. It was observed that some students approached the peer mentoring sites with genuine enthusiasm to participate and engage with their fellow participants. They were observed offering positive feedback and praise for helpful suggestions and advice posted by other site participants. Students who asked for guidance from other participants seemed genuinely grateful for the assistance and were observed expressing this.
Post: Words of wisdom

TY2, TY3, and TY1 gave great advice-ask questions, participate if possible, and keep a journal or write things down to use as resources later. All of those things will be very valuable to me as I complete my prestudent teaching. I feel that the more you know the more you grow and that is the goal of an education right? Thanks so much ladies!!! (MS3)

Post: Week 10

The advice I would give to the Seminar 105 students is to be confident in yourself and your abilities. Once you have the confidence in yourself you will portray a whole new teaching experience to your students. Also, I would recommend that you keep all your educational course syllabi as well as papers, powerpoints, and lessons you have written. When creating my teaching portfolio I learned the hard way that most syllabi supplied the INTASC principles and their corresponding work. Knowing this and saving the syllabi would have been a huge help and time saver!!! (MS1)

The following posts demonstrate the gratitude that some of the participants expressed.

Post: Thank you

I just wanted to take a minute and thank you for all of your input and knowledge taken from your experiences here at Drexel. It has relaxed me a bit more, and solidified that my confidence in my work and my future years of teaching is valid. (MS3)

Post: RE: Words of wisdom

“Thank you! Support from people going through the same things is great! (MS3)”

Theme 5: At times, the students diverted from the prompts provided by the facilitator and elected to use the sites in a broader fashion to gather and share information on the teaching profession with one another. This included sharing information about the teaching profession generally, but not necessarily pertaining to the prompts provided by the facilitator. Students shared tools for engaging learners, such as information
techniques as observed in classroom situations, educational resources, supportive ideas, systems for reward, grade-level preferences, and individualizing lesson plans.

The following discussion posts are excerpts from a discussion regarding grade choice preference.

Post: RE: student teaching

I am going to try pre-student teaching in 1st grade and hopefully as well in 5th grade if my principal will allow it. If I pass my German Praxis, I would really prefer Middle school, but would try high school as well. My fear is that I won't [sic] have the patience for young students... so I feel it is better to find out now then get into a position and not enjoy it. (MS1)

Post: RE: student teaching

The elementary school I worked at let [sic] you complete 6 weeks in one grade level and then the remaining 6 weeks in another grade. I think that is awesome, it gives you an idea of which grade you ultimately enjoy best. (MS1)

Participants offered their thoughts on developing their own portfolios and the uses of portfolios in teaching. Their discussions showcased the ways in which students' learning could be shown developmentally over the course of a time.

Post: RE: Question about Portfolios

You should really always be working on your portfolio. The more pieces of evidence you have the better. I have created many portfolios for different classes so I have a lot to choose from when I complete my final portfolio during my student teaching. (MS1)

Post: Question about Portfolios

"I have definitely thought about which pieces I've already done that I would like in my portfolio, I just wasn't just [sic] how much to add in and what sorts of things are the best." (MS1)
Post: question

"I have a question, when developing these portfolios, where do people get letters of recommendation from? I am only asking because my current employer does not do this." (MS1)

Post: question

I wondered that myself at first. But I think I would feel comfortable asking a professor whom I have had more than once. They are very accommodating and so helpful, I am sure they would give us a recommendation as they get to "know" us. Especially if we have been in their class several times. (MS1)

4.3 Summary of Results and Research Questions

1.) How are the first-year and third-year students enrolled in an online undergraduate teacher education program using peer mentoring sites specially crafted to engage new students with more experienced students?

This researcher found that both the first- and third-year students used the peer mentoring sites to ask fellow participants about their experiences and to share information regarding what they have learned. The discussion postings indicate that the first- and third-year students were using the peer mentoring sites to ask questions and raise concerns regarding program requirements they had not yet completed. The discussion postings also indicate that the students had questions on time management, especially regarding the scheduling of pre-student and student teaching. The postings also indicate that students asked questions about assuming the role of a teacher. Third-year students encouraged the first-year students to ask questions so that the discussion board could be a helpful place for them. When students posted a question or concern, other students were ready and willing to post responses that could help. If they were not fully able to answer the question or concern, the students would provide direction for the students to have their concerns addressed.
In the peer mentoring sites, the students found other students who had similar questions about program requirements, the coordination and registration of the requirements, and teacher preparation. The peer mentoring sites became a place where first- and third-year students could rely on each other, learn from the experiences of others, and aid others as they continue their progression to become teachers.

The students in the peer mentoring settings also sparked conversations regarding broader issues in education. Conversations developed around topics of lesson planning, issues in special education, mentoring for first-year teachers, and substitute teaching, among other topics. As conversations developed among the students, it was observed that the students discussed broader issues of education beyond the topics of program requirements.

2.) What communication patterns emerge from the interactions of students in the online peer mentoring sites?

This researcher noted the students’ close adherence to the prompts provided by the facilitators. The students had much information to share regarding the praxis exams, pre-student teaching, and classroom management techniques among others. The students were enthusiastic to ask questions and provide information and knowledge to their fellow participants, easing the concerns and worries of some of the participants while also guiding other students.

The social network analysis shows that students in the peer mentoring settings were active in establishing direct ties with other students. MS1, MS2, and MS3 were more active than MS4, MS5, and MS6. Additionally, the analysis shows that the participants in MS1, MS2, and MS3 settings established a larger percentage of ties with other members of the respective site than those of MS4, MS5, and MS6.
The social network analysis shows that the students did not depend on one particular participant for information, support, or advice. The centralization scores for all of the peer mentoring sites indicate the sites developed with mid- to low centralization levels, which show that those who established connections with other participants in these settings were likely not to focus on one particular fellow participant.

The social network analysis shows that the most central actors in these settings are almost equally first and third-year students. This information indicates that level is not necessarily a factor in the participation of students in these settings. First-year and third-year students were equally as likely to engage in conversations, share experiences, and ask questions to learn from the other participants.

3.) What factors influence the interaction patterns among the students in the peer mentoring sites?

   a) What relationships and roles arise from the interactions?

   The factors that influence the interaction patterns in the peer mentoring sites include (1) the number of students in each peer mentoring site, (2) the effect of tone of certain student postings, i.e. a friendly tone seemed to add collegiality and develop a sense of community within the group, and (3) student interest in gaining clarification and further information. These factors provided an environment for both first- and third-year students to share experiences, ask questions, and learn from the experiences and knowledge of other students as the themes outlined in Section 4.2.1 demonstrate. The types of communication patterns, i.e. friendly posts offering personalized information, set a tone for group communication. This tone encouraged other students, especially new students, to share their questions, concerns, and experiences. Discussion posts that were
friendly seemed to encourage others to reciprocate. When students came together and introduced themselves to others in a friendly nature, the students seemed to demonstrate an eagerness to participate that then encourages others to join the conversation. This generated more participation in the online discussions.

Participants could see fellow students asking questions and then receiving detailed responses from other students. Additionally, students could see how their experiences or knowledge could help other students. The social network analysis and interpretive content analysis showed that first- and third-year students formed relationships with one another. Students at both the first- and third-year levels were very active in providing guidance and advice at both the same and across levels, thereby indicating that students at each level assumed the role of advice and information sharing. In providing their own experiences and advice in navigating through the process of completing these exams, others could learn and benefit from their experiences.

4.4 Conclusion

This study used a mixed methods approach combining interpretive content analysis with social network analysis to examine interaction patterns in six (6) online peer mentoring sites. The social network analysis and interpretive content analysis presented in this chapter revealed several phenomena, the most important of which is the extent to which novice learners have come to occupy central roles in terms of facilitating discussions and knowledge sharing. Chapter Five follows with a summary, conclusions, and recommendations.
CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This research addresses the purpose and function that online peer mentoring sites assumed for students within an online undergraduate teacher education program. In this study, social network analysis and interpretive content analysis provided two different perspectives with which to view the discussion board interactions of the six peer-mentoring sites selected for this study. Together, the social network analysis and interpretive content analysis allowed for a holistic view of the peer-mentoring sites that assisted this researcher in developing an analysis and interpretation of the function and purpose of the peer mentoring sites. The social network analysis identified the communication patterns that developed among the students within each term considered in this study. The interpretive content analysis identified the topical issues of interest to the students and the nature of the relationships they developed as co-participants in each term considered in this study.

Studying the peer-mentoring sites aggregately using social network analysis allowed for the collection of information regarding ties between all pairs of actors (Hawe and Ghali, 2008). This data provided insight into the social structures that developed among the actors in each peer mentoring site considered. Specifically, social network analysis showed when a site participant directed communication to other members of the sites and what students, in turn, reciprocated these communications. The social network analysis allowed this researcher a view of the interpersonal activities of the peer-mentoring participants at a macro level through the creation of sociograms. Additionally, this researcher was able to calculate density and centralization scores for each network and degree centrality scores for each actor. These calculations provided a way of
examining the relationships that developed among the students. The social network analysis also enabled consideration of attribute data as described in Section 3.9.2 for the participants of the peer-mentoring sites. This data was used at the aggregate level to inform pattern formations based on level in the program, participation in more than one peer-mentoring setting, age, gender, race, location, and ethnicity.

The interpretive content analysis provided a method for this researcher to analyze and interpret the interpersonal and individual activity of the peer-mentoring sites by analyzing the content of the discussion board posts. The facilitators provided prompts as shown in Table 1 for each week’s discussion and it was the students who created the activity and interactions in these settings. The participants’ contributions came to define the purpose and function of the peer mentoring sites. Some of the discussion posts reflected genuine interest and excitement of some students to engage with others both at the same and across levels. The interpretive content analysis provided insight into the discussions by demonstrating topics of interest to the students, either as posts responding to facilitators’ prompts or as topics raised by the students independently. Further, the content analysis of the discussion posts indicated topics that encouraged students to form relationships and the ways in which the discussions developed and evolved.

5.1 Summary of Results

Of the six (6) peer mentoring sites studied, the social network analysis showed that more than half of the participants established ties within MS1, MS2, MS3, and MS6. The highest percentage of participants that established ties was in MS1 at 98%. MS4 and MS5 showed lower levels of tie establishment among the participants, with 27% of participants in MS4 establishing ties and 33% of the participants in MS5 establishing ties.
This indicates that while more than a quarter of the students in MS4 and MS5 established ties, the rate was still lower than those in MS1, MS2, MS3, and MS6.

On the whole, first-year students outnumbered third-year students in each of the peer mentoring sites considered. However, the central figure totals from each of the peer mentoring sites indicate that third-year students had more central roles over the six sites than first-year students. The larger number of first-year students in each site does not correlate with the emergence of central actors. Overall, the facilitators did not assume central figure roles in these settings.

Two sociograms were created for each peer mentoring site to analyze the activity of the participants and the relationship and communication patterns developed in each site. The first sociogram created for each site displays the attribute data of level in the program and participation in more than one peer mentoring site. The second sociogram created for each site demonstrates the attribute data of gender, race, location, and ethnicity as described in Section 3.9.2. The sociograms with age attributes show that the students were comprised of a large age range, 21-60 years. In terms of age, the oldest participants in MS1, MS2, MS3, and MS6 established ties with others in these sites. In MS4 and MS5, the oldest students were isolates, meaning that they did not establish any direct relations with other participants. The students situated in the median age range established ties with others in MS1, MS2, MS3, MS4, and MS6. MS3 and MS6 also showed some of the students in this median age range were isolates. The participants in the median-age range in MS5 were all isolates. The sociograms showed that the majority of the younger participants established ties in each of the peer-mentoring sites. MS1, MS2, and MS3 showed many of the younger students to be on the periphery with very
few established ties. MS1 and MS2 had a few exceptions with very few younger students in a central role. MS4 and MS5 showed some of the younger students were isolates. Overall, it was observed that age is not indicative of level of participation within the peer mentoring sites considered in this study.

In terms of ethnicity, the white, non-Hispanic students were the largest and most active population of students over the six peer-mentoring settings. MS1, MS2, and MS3 had a higher percentage of white, non-Hispanic students with established ties. MS4 and MS5 showed that a higher number of white, non-Hispanic students were isolates. MS6 had the same number of white, non-Hispanic students with established ties and those who were isolates, five (5). Overall, the students with white, non-Hispanic ethnicity assumed central roles in the peer mentoring sites. Since the white, non-Hispanic participants made up the majority of these populations, this result may be expected.

The sociograms showed that the African-American participants in MS1 and MS3 established ties with others. MS4, MS5, and MS6 had a single African-American participant, each of whom was an isolate. The two (2) Asian-American participants in MS1 and MS2 established ties with others and the single Asian-American student in MS4 was an isolate. MS1 and MS6 had a single Puerto Rican-American participant, each of whom established ties with others. MS2 had a single Puerto Rican-American student, who remained an isolate. The students of Hispanic descent in MS2 were both isolates. The Cuban student in MS3 established ties with others in this site, while the Cuban student in MS2 did not. The participants in MS1 and MS6, who did not disclose their ethnicity, established ties with others. The three (3) participants in MS2 and one (1) participant in MS4 who did not disclose their ethnicity established ties in these settings.
Two (2) participants in MS2 and five (5) participants in MS4 who did not disclose their
ethnicity remained isolates. The interpretive content analysis showed that the participants
did not mention their ethnicity in any of the discussion posts across all of the sites.

In terms of gender, the peer mentoring sites predominantly consisted of females.
More than half of the female participants established ties in MS1, MS2, MS3, MS4, and
MS6. MS5 showed that 67% of the female participants were isolates. MS1, MS2, MS4,
and MS6 included male participants. The male participants were isolates in MS4 and
MS6. The single male participant in MS2 was a peripheral participant. MS1 had the
most active male participants across all of the sites considered. Two (2) of the male
students in MS1 were fairly central members of the peer mentoring site. Overall, the
female students were both more predominant in number and more active participants in
the peer mentoring sites.

In terms of location, the participants in the six peer-mentoring settings came from
fourteen (14) American states and one (1) territory. The territory and states ranged in
area from the Northeastern, Mid-Atlantic, Northwestern, Western, Southwestern,
Midwestern, South, and Southeastern regions of the United States. The participants of
the six peer-mentoring settings were predominately from Pennsylvania. The second
largest population of participants in the six peer-mentoring sites was from New Jersey.
As Drexel University is located in Pennsylvania and in close proximity to New Jersey
may have had some correlation with this preponderance. The students from Pennsylvania
were the most active in the peer-mentoring settings. The students from New Jersey were
the second largest participating population in these settings. MS1 and MS2 had the most
diverse population of students establishing ties. Students from New York, Texas,
MS2 had students from Virginia, Maryland, Arizona, Kentucky, Connecticut, and New
York establishing ties in addition to the students from Pennsylvania and New Jersey.
MS4 and MS6 had similar geographic pattern compositions, with most students
establishing ties from Pennsylvania and New Jersey. One student from Tennessee the
only non-Pennsylvania and non-New Jersey resident established ties with other
participants in both MS4 and MS6.

The sociograms depicting level and participation in more than one peer-mentoring
setting demonstrate that the third-year students established ties with students more often
in MS2, MS4, MS5, and MS6. MS1 and MS3 had the highest number of established ties
by first-year students. In examining facilitator relations, the facilitators had the most
established ties in MS1 and MS2 over the six settings. In terms of participation in more
than one peer mentoring site, there were only six (6) students out of thirty-five (35) who
participated in more than one peer mentoring site that remained isolates over the course
of the six settings. Overall, students who participated in more than one peer mentoring
site were likely to be active members of the sites. Thus, participation in more than one
peer-mentoring site is a good indicator for the establishment of ties in these settings.

MS1, MS2, and MS3 had the most active participation rates of the peer mentoring
sites considered in this study. These peer mentoring sites also had the highest population
totals of the six sites selected for this study. One possible explanation is that students
may have been more comfortable participating in these settings with a larger population
of participants. MS4 had a low rate of participation overall. MS5 had very few
participants establish ties. MS6 had about 50% of its participants establish ties. Based
on the activity patterns observed over the six sites considered in this study, a large population size is a strong indicator of increased participation levels.

The centralization scores for outward communications for MS2 and MS3 show that participants receiving information are not a centralized group of a few actors. Conversely, MS1 had the highest centralization score, 63%, demonstrating a substantial amount of centralization in the outgoing communications. The centralization score for MS6 for outward communications was 27.083%, showing somewhat less centralization. The network centralization scores for outward communications for MS4 and MS5 were very similar, 10.72% and 10.938%. These scores show that the outgoing communication patterns for the participants are very decentralized. These scores demonstrate that the participants are not directing communications to particular members of the setting.

The network centralization scores for established ties based on receipt of communications from others in MS2 and MS3 are less centralized. MS1 was slightly higher at 42%, showing the highest centralization level for ingoing communications. MS5 received a network centralization score of 25% for established ties based on receipt of communications. The network centralization scores for established ties based on receipt of communications that MS4 and MS6 received were both below 20%. These scores show decentralized patterns, where students are not directing communications to particular members of the setting.

The density scores of the six (6) peer mentoring sites show that MS1 and MS3 have similar levels of cohesion, 23.1% and 18.8%. MS2 has a lower cohesion level, 11%. MS6's level is slightly lower at 8.3%. MS4 and MS5 had the lowest levels of cohesion, 1.7 and 2.8% respectively. All cohesion levels are below 25%. In as much as the
mentoring sites were 10 weeks in length, having participant tie levels of less than 25% may seem reasonable. For the participants, establishing ties with a quarter of the participants over ten weeks while balancing requirements for other courses may be a reasonable amount. The low levels of cohesion that MS4 and MS6 demonstrated that the participants in these sites did not establish many ties. Even with the low population levels of each of these sites, the third-year students were active participants in both of these sites. The content analysis showed that those who did participate encouraged the first-year students to ask questions.

Using interpretive content analysis, and as identified in Chapter 4, this researcher identified five main themes derived from the topics within the discussion board posts: (1) the students generally followed the prompts provided by the facilitators in the discussion board posts, (2) cross-level and same-level peer mentoring occurred among the student participants, (3) the scope of the peer mentoring sites expanded beyond general information sharing among the participants regarding program and teacher certification requirements, (4) the students exhibited positive experiences in the peer mentoring sites, and (5) at times, the students diverted from facilitator prompts and elected to use the sites in a broader fashion to gather and share information on the teaching profession with one another.

The interpretive content analysis showed that students followed the prompts provided by the facilitators. Content analysis of the discussion board posts identified two specific topics that generated significant attention from the student participants: (1) the Praxis exams, and (2) pre-student teaching experiences. Regarding the Praxis exams, students were observed discussing the Praxis exam registration process, i.e. what exams
to complete and where the exams are offered, as well as the content of the exams. Students posed a variety of questions pertaining to pre-student teaching requirements. Specifically, this researcher observed first-year students seeking information on the coordination of field placements. With many students in this program located in a variety of geographical locations, it is understandable that students would communicate with one another on this topic. Other questions relating to pre-student teaching requirements included (1) whether Drexel would choose each student's pre-student teaching placements, (2) what the pre-requisites necessary for pre-student teaching are, and (3) when Drexel will inform a student that placement has been confirmed.

The role of the facilitator in the peer mentoring sites generally was defined and fairly limited. The facilitators posted the prompts intended to encourage the student participants to communicate with one another. On occasion the facilitators clarified information posted by students in the peer mentoring sites. This ensured that the information that the students posted accurately reflected the program or teacher certification requirements. One example of facilitator involvement concerned the issue of the location to complete the pre-student teaching requirement. Some students asked whether they could request a specific school where they could fulfill their pre-student teaching requirement. A fellow student participant responded to these posts stating that students could select their pre-student teaching assignment. A facilitator clarified that a student can make a request to be placed in a specific school, but this was not a guarantee of placement. The field placement office attempts to accommodate such requests by working with the requested school, but cannot guarantee a placement in that school. This example demonstrates how facilitator presence ensures that students gain accurate and
clear guidance within the peer mentoring sites. This underscores the role of the facilitator and demonstrates the justification for including a facilitator as part of every mentoring site.

The interpretive content analysis of the peer mentoring sites indicated that many student participants had similar questions about program requirements and courses, satisfying and completing these requirements and courses, and general questions about what to expect when they emerge from the program as teachers. Both peer-to-peer and cross-level peer mentoring were observed as occurring among the students. Third-year students were observed encouraging the first-year students to ask questions and seek clarification on issues concerning the program. The interactions showed that third-year students provided support and guidance to first-year students and other third-year students. The first-year students provided mentoring to third-year students and to their fellow first-year students in the majority of the settings.

The sociograms generated by the social network analysis show that the first-year and third-year students established ties with both levels of students in these settings. MS5 was an anomaly for first-year tie establishment. The sociogram for MS5 shows that first-year students did not establish any direct ties with the other students in this setting. Conversely, the interpretive content analysis of this peer mentoring site indicates that the first-year students posted generally to the entire group of participants. These communications would not have been measured by the social network analysis because this analysis was programmed to measure only directed ties in this study. This is a prime example underscoring the ways in which these methods serve the goals of this study and how the two methods of analysis employed in this study can inform one another.
Other topics raised by the student participants through their discussions include how to create a lesson plan, how to manage feelings of nervousness when giving a lesson for the first time, and most frequently, how to manage the program with personal responsibilities outside of the obligation of completing the course requirements. Many of the students were observed going beyond general information sharing about the course requirements and the academic program. The peer mentoring sites included discussion board postings from the students on how they were balancing a family, a full-time job, and a home while enrolled in this program. Some students wrote of the support systems at home and other methods used to assist them in managing their personal responsibilities outside of completing this coursework.

The student activity within the peer mentoring sites and discussions observed through the interpretive content analysis demonstrated that students were comfortable discussing issues they would face when they assumed the role of a teacher. The interactions showed that many of the site participants were facing the same dilemmas or questions. Some students offered their experiences with schools and teachers from their roles as parents or based on situations that they were experiencing in their work or field-based practica. Providing relevant details regarding these experiences allowed students to ask questions for better understanding of the parallel nature in their individual situations. The students provided examples of ways their cooperating teachers handled a particular situation or how they, as parents, would like to learn about a school issue involving their child.

In the peer mentoring sites, the students were seen sharing their anxieties and worries about standing in front of a class in the act of teaching. Other students were seen
sharing words of encouragement and inspiration in response. For example, in one
discussion post, a student was seen sharing the fear of teaching a lesson prepared for the
pre-student teaching placement for the very first time. The responses this student
received from other participants in the peer mentoring site demonstrated a good deal of
support. More experienced students in this discussion thread wrote of their own
experiences in presenting a lesson for the first time. One student who related to
continued nervousness when presenting a lesson emphasized that practicing the lesson
plan helps in dealing with feelings of nervousness. The original poster expressed
gratitude for the opportunity to encounter and communicate with others who had similar
experiences and feelings.

The discussions showed that the students found the peer mentoring sites to be
useful in enabling them to communicate with one another about issues of professional
development, e.g. questioning how to formulate a portfolio, complete the background
checks in order to prepare for pre-student teaching, and how to draft a lesson plan, among
many others. These findings underscore the role of the peer mentoring sites in enabling
the participants to learn more about becoming well-prepared and proficient teachers. The
peer mentoring sites provided newcomers to the undergraduate education program
meaningful interactions regarding program and education related topics and experiences.
The sites also provided third-year students with support and advice from first-year and
other third-year students as they wind down as students and embark on their professional
teaching careers.

The interpretive content analysis showed that students discussed topics outside of
the prompts provided by the facilitators. Some examples of these topics include: students
discussing coping methods and techniques when studying for their exams in mathematics, the use of portfolios as assessment tools in middle-school grades, when to begin applying for teaching jobs, to name a few. Also, the students were seen re-visiting prior weekly discussions well after subsequent discussions had commenced. Again, discussion threads were never formally “closed,” students were free to re-visit and re-post to discussion threads from prior weeks in the peer mentoring sites if they so chose. The action of students to re-visit posts from prior weeks, while not examined specifically in this study, shows that some discussions genuinely engaged the students and offered them reasons to return to the site to post additional questions, share information with their fellow participants, continue discussions and see what others had posted.

The peer-mentoring discussions demonstrated that student participants created posts crafted with care and thoughtfulness. The messages convey that the students were very eager and excited to share their experiences and thoughts, what they would recommend and what may be helpful for their peers. Overall, the peer-mentoring discussions demonstrate supportiveness, understanding, and a strong interest in becoming educators. The participating students demonstrated enthusiasm to engage with students of their own program level as well as those across levels.

The interactions among the student participants demonstrate dilemma-driven and practice-centered interactions (Lave, 1997). The peer mentoring site discussions indicate that students are using the opportunity and resources provided to them through the peer mentoring sites to engage with each other regarding program-related or teaching-related matters. The conversations show the students are excited and driven to become teachers, learning and preparing as much as they are able. The conversations show their interest in
being prepared to move forward on their path to become teachers. The following quotes demonstrate these sentiments, "I have become aware of the importance of meeting students' needs both academic and personal. I have also learned how to grab my students' attention and help any student learn meaningfully" (MS1).

This is not a 9 to 5 job. It requires my full commitment heart and soul. By knowing I am committed I can give myself the "authority to teach." This means that I must be open to new learning throughout my career, new experiences and kind criticisms [sic], but I can't let someone else undermine my belief in myself and why I chose to be a teacher. (MS1)

Largely, the interactions of the peer-mentoring sites provided the students the opportunity to engage in discussions with others regarding their area of practice (Lave, 1997). The students were able to collaborate with their peers and engage in problem-solving activity and inquiry. Computer-mediated communication provided the opportunity for all of the students enrolled in the program to connect with their fellow program participants, despite geographic location, as indicated by the social network analysis. The students could relate to their fellow students, located in other parts of the country, by discussing similar situations they experienced. The students, through their information sharing, exchanged new perspectives on their questions or areas of concern and were seen to develop an environment of collegiality. The collegiality that developed among the students offered can-do approaches to be successful in the navigation of the program and preparation to enter the field of education. Discussions with fellow participants provided practical ways for students to confront and resolve issues of concern to them, thereby enabling the students to build confidence in their ability to handle challenging issues or difficulty.
The peer-mentoring discussions show that the participants found ways to help each other gain clarity regarding program requirements and processes and teacher preparation. Through their sharing of success stories or those that they have witnessed in their work or field practica, the participants enabled each other with ways to handle issues before them or that they may encounter in their student teaching or when they enter the classroom as a stand-alone teacher. Students showed their support toward their fellow students who were in the process of completing milestone requirements of the academic program. For example, a student in MS2 authored a discussion post expressing both excitement and nervousness concerning pre-student teaching. A fellow student from MS2 authored a response relating to these feelings about pre-student teaching, indicating that in her experience the second lesson she presented was much easier. This is an example of how students supported one another as they moved toward completing this educational program.

5.2 Limitations

This study shows how six (6) peer mentoring settings formed organically through participant activity. The results of this study may be beneficial to others in their work with online learning. The participants of this study are mostly nontraditional students returning to college study following a hiatus. With the expectation that these students have different needs and experiences than traditional full-time students, this study illustrates the patterns of online students in a cross-level mentoring environment and adds to this body of research.

Both the size and length of this study may affect the ability to generalize the results of this study. A delimitation that narrowed the scope of this study is its
confinement to a specific phenomenon, participants, and site selected to analyze student experiences in online peer mentoring. The data collected for this study will be solely from one university. The nature of the data sample will be predefined and reflect distribution based on university procedures and course offerings. The sixty-week time period of this study allows the researcher to view this setting over six ten-week terms to determine how these students, i.e. newcomers and experienced, engage in this setting.

The social network analysis and interpretive content analysis provided a very holistic view of the peer-mentoring interactions. The interactions and the attribute data provide a plethora of information regarding the interactions of the students in these settings. The sites provided a chance for students to interact while enrolled in either the freshmen or junior pedagogy courses. These defined units of time did not allow for student interaction over longer periods of time, making it difficult to speculate what such interactions would have shown or how they would have developed.

The social network analysis portion of this study does not examine discussion posts that were sent to all participants in each peer mentoring site, i.e. “blasts”. While the study was designed to incorporate the blast posts into the interpretive content analysis, eliminating these blasts from the consideration in the social network analysis with only a few members can show results that may be incongruent.

This research analyzed communications only made in the discussion forums. This study does not account for relationships formed from communications in prior coursework before the mentoring experience began. This study does not measure how any of the isolates as determined through the social network analysis benefit from passive participation, i.e. the reading of posts by others in the peer mentoring sites. This research
does not predict if the people who did not establish ties with others benefit from any observations and learning that occurs. Additionally, this researcher did not collect data regarding participant access to the internet and their level of experience using the internet and online learning platforms.

5.3 Future Research

The findings of this study have implications for future developments in online learning opportunities, not only in higher education but also in professional capacities, particularly to aid new employees in the profession. This research suggests that providing forums where participants can discuss their specific areas of practice – be it educational or professional - is a beneficial and worthy undertaking. Such sites provide a forum where participants may discuss situations they encounter in their day-to-day activities as students learning and preparing to enter a profession. Additionally, the sites allow the participants the opportunity to ask questions, collaborate, discuss solutions to problems or dilemmas, and the chance to support one another as they grow and develop in their learning and career preparation. Participants find similarities and differences, useful ideas and concepts, a repository of support, a sounding board for new ideas, and overall a place where field-related ideas and topics can be discussed.

Designed communities of practice have been studied by Barab, Barnett, & Squire (2002). Their research has shown the benefits of such contexts for situating content and, additionally, for learning while situated in a community. This research builds on the research of Barab, Barnett, and Squire (2002), Barab & Duffy (2000), Lave and Wenger (1991), and Lave (1997) to show the ways in which undergraduate students of varying levels used specially designed peer-mentoring settings.
This study shows the participant activity in six (6) peer-mentoring settings. Continued research into specially crafted settings that allow groups of individuals preparing to enter a shared profession or career would allow for a greater understanding into the roles that such sites can provide these “apprentices”. Moreover, future research would allow for a better understanding of the ways that other student populations would engage in this type of setting with others of their respective academic disciplines. Additionally, the assessment of the benefits of such sites to other student populations, including high school students and graduate students, could occur in the future.

The social network analysis of this study measures the establishment of ties, the levels of cohesion, and the centralization patterns for each site. This study determined that third-year students assumed more central roles in the six (6) peer mentoring sites studied. Additionally, participation in more than one peer mentoring site was indicative of increasing participation in a peer mentoring site. The cohesion levels of all six (6) peer mentoring sites ranged from 1.7% to 23.1%. The centralization levels for the six (6) peer mentoring sites ranged from 10.72% to 63.116% for outdegree centrality and from 10.72% to 42.078% for indegree centrality. These percentages indicate that there was a wider disparity in communication patterns directed toward other participants than in the patterns of communications received. Additionally, these scores indicate that there were higher levels of influence in these settings. Future research can inspire new studies where students are surveyed to see what outside influences affect frequency of participation, e.g. access to technology and information on what they are doing in addition to being students, could be beneficial.
5.4 Conclusions

Since online programs do not offer students the opportunity to interact with other students in a face-to-face manner at the end-of-course meetings as traditional campus-based courses do, online students are missing a potentially viable opportunity. Providing students in online programs with opportunities to engage with fellow students, especially new students with more experienced students, provides a venue where students can learn from, share, post questions in their area of practice, and broaden their knowledge. Engaging with fellow students to discuss the transition to a new program, completing the program, and planning to enter the field they have chosen provides an opportunity where students can collaborate regarding their learning, share what has worked for them and what has not, and identify and access resources that can be helpful in navigating their way. Not only does this allow students a chance to get to know other students in their program, but it also provides a potential for students to engage in conversations regarding issues that concern them as they ready themselves to become teachers. As Lave (1997) describes, such opportunities give students a chance to engage in active learning, where the participants can discuss their knowledge of topics, see pros and cons, come to new understandings through collaboration, and find ways to craft or manage solutions and dilemma-based situations.

Because online students do not have the chance to engage with others outside of their classes, students in such programs can experience feelings of isolation. The peer-mentoring sites have given students the opportunity to discuss their questions, concerns, dilemmas, and experiences, and find support. Additionally, the peer-mentoring sites provided students with the chance to discuss many practice-related questions and
experiences. A large majority of students utilized the sites, demonstrated the usefulness of the sites for them in planning, scheduling, completing course requirements, and looking to and planning for their future work as teachers.

Engaging in these types of discussions is not always possible in the students’ required coursework. In these settings, the students must follow the discussions that the instructors lead. Contrastingly, in the peer-mentoring sites, the students can post in regards to the prompts and/or regarding topics of interest to them. What they find is that other students have similar interests and experiences, as well as similar concerns. The experiences of other students can shed influence over the discussions and provide ideas or situations that may be informative or helpful to others. Others can then share this knowledge with people they may encounter in the future. This information expands the knowledge of those involved and those with whom the participants connect with in the future. By discussing the areas of educational practice of aspiring teachers, these students can learn from one another, build deeper understanding, gain support and confidence from one another, and learn ways to tackle issues that will ultimately present themselves.
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EDUCATION

Drexel University
Doctor of Philosophy, Educational Leadership and Learning Technologies, September 2012  
Philadelphia, PA

Teachers College, Columbia University
Master of Arts, Curriculum and Teaching, May 2001  
New York, NY
Thesis: Gender, empowerment, and culture among kindergarten boys in a playground environment

State of Connecticut’s Alternate Route to Certification Program
Certification in Middle School Social Studies and Language Arts, August 1998  
Hartford, CT

University of Warsaw
Polonicus Program for Training in the Polish Language, January - June 1998  
Warsaw, Poland

Villanova University
Bachelor of Arts, General Arts and Humanities, Dual minor in Education and Philosophy, May 1996  
Villanova, PA

EXPERIENCE IN EDUCATION

Drexel University, Goodwin College
Academic Services Manager, September 2008 - present  
Philadelphia, PA

Drexel University, School of Education
Advisor, Master of Science Program in Teaching, Learning, & Curriculum, 2005 - 2008  
Senior Program Coordinator for Undergraduate Studies, March 2002 - September 2008  
Philadelphia, PA

Drexel University, School of Education
Adjunct Instructor, 2004 - present  
Philadelphia, PA

The Rock School
Director of Curriculum, 2001 - 2002  
Philadelphia, PA

Brunswick School
Kindergarten Teacher, 2000 - 2001  
Greenwich, CT

Glenville School
Assistant Teacher, 1999 - 2000  
Greenwich, CT

INTERNATIONAL EXPERIENCE

Open Society Institute & Soros Foundation Network
Administrator, 1998 - 1999  
New York, NY

International American School
English Teacher, 1997 - 1998  
Warsaw, Poland

Martinihaus School
English Teacher, 1996 - 1997  
Rottenburg am Neckar, Germany

PRESENTATIONS

Re-Visioning Undergraduate Teacher Education: A Model for Curriculum Reform (Grdina, M.J. & Ruane, R.), Lilly Conference, Miami Univeristy of Ohio, November 2006.


SKILLS, AWARDS AND CERTIFICATIONS

- 2010 Goodwin College Staff Service Award
- 2006 School of Education Staff Service Award
- 2005 Drexel University Mini-Grant Award received to develop and instruct an online course in experiential education.
- 2004 National Multiple Sclerosis Society “MS Leadership Award”
- 1998 International American School “Teacher of the Year Award”
- 1992 Scranton Preparatory School “Gold Medal in French”